

Chapter IV: Environmental Consequences

Introduction

The National Environmental Policy Act requires that environmental documents disclose the environmental impacts of a proposed federal action, reasonable alternatives to that action, and any adverse environmental effects that cannot be avoided should the proposed action be implemented. This chapter of the Cascades Diversion Dam Removal Project Environmental Assessment analyzes the environmental impacts of the three project alternatives on natural resources, cultural resources, and social resources. This analysis provides the basis for comparing the beneficial and adverse effects of the alternatives.

Following this introduction, the chapter presents the methodologies used in the environmental impact analysis. The impact analyses sections are organized by alternative. The first section analyzes Alternative 1 (the No Action Alternative), including impacts on natural resources, cultural resources, and social resources, and presents cumulative impacts and impact conclusions. The same framework is applied to Alternatives 2 and 3 in subsequent sections. Environmental impacts are summarized in table II-2: Summary of Environmental Consequences, located at the end of Chapter II, Alternatives.

Cumulative Impacts

A cumulative impact is described in regulations developed by the Council on Environmental Quality, Regulation 1508.7, as follows:

A “cumulative impact” is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

To determine potential cumulative impacts, projects within the Cascades Diversion Dam region were identified, including projects within Yosemite Valley and the Merced River corridor. The cumulative projects identified included past actions as well as any planning or development activity currently being implemented or planned for implementation in the reasonably foreseeable future. Appendix E, Potential Cumulative Actions, contains the list of cumulative projects included in the cumulative impacts analysis.

The impacts of these cumulative actions are evaluated in conjunction with the impacts of each alternative to determine any additive effects on a particular natural, cultural, or social resource. Because most of these cumulative actions are in the early planning stages, the evaluation of cumulative impacts was based on a general description of the project.

Context, Duration, Intensity, and Type of Impact

Context

The context of the impact considers whether the impact would be local or regional. For the purposes of this analysis, local impacts would generally be those that occur within the immediate vicinity of Cascades Diversion Dam and downstream to the Cascades Picnic Area.

Duration

The duration of the impact considers whether the impact would occur in the short term or the long term. Short-term impacts are temporary, transitional, or removal-related impacts associated with project activities. Long-term impacts are typically those effects that would last 10 years or more or would be permanent.

Intensity

The intensity of the impact considers whether the effect would be negligible, minor, moderate, or major. Negligible impacts would not be detectable and would have no discernible effect. Minor impacts would be slightly detectable, but would not be expected to have an overall effect. Moderate impacts would be clearly detectable and could have an appreciable effect. Major impacts would have a substantial, highly noticeable effect.

Type of Impact

Impacts were evaluated in terms of whether they would be beneficial or adverse. Beneficial impacts would improve resource conditions. Adverse impacts would deplete or negatively alter resources.

Impairment

Pursuant to the 1916 Organic Act, the National Park Service has a management responsibility “to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” As a result, the National Park Service cannot take an action that would “impair” park resources. National Park Service *Management Policies 2001* provide guidance on addressing impairment.

Impairment is an impact that, in the professional judgement of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Impairment of park resources and values was evaluated on the basis of duration and intensity of impacts.

Director’s Order #12 requires that impairment be addressed in all environmental assessments and draft and final environmental impact statements, as well as in the decision documents (Finding of No Significant Impact, Record of Decision). In this environmental assessment, impairment is addressed in the conclusion section of each impact topic under each alternative.

Methodologies

This section presents the methodologies and assumptions used to conduct the environmental impact analysis for each resource topic.

Natural Resources

Geology, Geologic Hazards, and Soils

This impact assessment focuses on effects that geologic processes in Yosemite National Park could have on visitors, personnel, and facilities under each alternative of the Cascades Diversion Dam Removal Project. Geologic processes negatively affect visitors, personnel, and facilities when events such as rockfalls,¹ earthquakes, and severe soil instability result in injury, death, or damage to facilities. The assessment also focuses on the effect of project alternatives on geologic processes, namely the formation and conservation of soil resources. Project-related actions could affect soil resources through accelerated erosion, soil loss, or soil removal.

Several assumptions regarding facility placement, geologic design parameters, and public safety were integrated into this assessment, as summarized below.

- It is not possible to avoid risks due to geologic processes such as earthquakes and rockfalls. Considering this, some facilities located within the park, including those in the Merced River gorge, would be exposed to the risk of damage from rockfalls.
- In emergency situations, the National Park Service may mechanically trigger a rockfall, but in most cases the National Park Service will allow natural processes to occur unimpeded.
- The National Park Service is currently revising its management policies pertaining to geologic resources and hazards. The focus of these guidelines will be to protect visitors, employees, and infrastructure from geologic hazards and to locate facilities out of geologically hazardous areas.
- In the event of a rockfall, the National Park Service would close the affected area to protect visitor and employee safety. Rocks on roads would be removed, but rockfall talus in rivers would not be removed, unless the river is dammed and flooding threatens utilities or facilities.
- Geologic risks to public safety are rarely predictable, and the extent of potential harm to people and property cannot be quantified. The analysis of effects was qualitative, and professional judgment was used to reach reasonable conclusions as to the context, intensity, and duration of potential impacts.
- Project activities would remove and/or cover the soil surface and result in significant changes to the basic soil properties of the topsoil. Excavation and removal of soil would result in a long-term impact because the basic soil properties, which have taken thousands of years to develop, would be altered. Capping the surface would reduce water movement and minimize the opportunity for the normal processes of physical transport and chemical transformations, such as illuviation, eluviation, and nutrient cycling.

¹ Throughout Chapter IV, Environmental Consequences, unless otherwise noted, “rockfalls” is used as a generic term to refer to rockfalls in the stricter sense but also to rockslides, debris avalanches, debris flow, and rock avalanches.

- Soil excavation and redistribution would result in removal or mixing of the soil profile and disrupt soil structural characteristics, interrupting the chemical, physical, and biological processes that naturally occur in the soil. The level of change would be dependent on the level of the alteration. It could take many years for the soil profile to redevelop.
- Soil compaction could occur as a result of project activities or in areas of intensive use such as trails. Wetland soils are very susceptible to compaction effects. Soil compaction reduces infiltration rates, thereby increasing surface runoff and the potential for erosion. Deep compaction of soils could impede subsurface flow. In turn, these effects could alter soil chemical processes such as nutrient transfer, biological processes such as root development and microbial patterns, and physical processes such as soil structure. Vegetation growth on compacted soils is often limited due to low infiltration and poor root penetration.
- Removal of vegetation through project activities or pedestrian use could result in accelerated erosion of the soil surface. Soils on steep slopes and along watercourses are especially susceptible to erosion.
- The addition of chemical constituents into the soils as a result of pavement installation, untreated runoff from paved surfaces, or from incidental spills could alter micro- or macro-organism populations, diversity, and dynamics. Machinery involved with project activities could deposit small amounts of natural and synthetic petrohydrocarbons onto soils through equipment failure and normal operations.
- Ecological restoration that would minimize erosion potential and increase organic matter in the soil would be considered a beneficial effect. Short-term adverse effects could occur during site restoration activities where work equipment could compact soils, temporarily eliminate groundcover vegetation, and cause potential erosion from surface water runoff over the exposed soils.

Hydrology, Floodplains, and Water Quality

This assessment focuses on the physical and chemical processes of the Merced River, and how (relative to the No Action Alternative – Alternative 1) the two action alternatives (Alternatives 2 and 3) would affect hydrologic processes, both during project activities and following project completion. The hydrology impact assessment herein evaluates how project activities and dam removal would affect channel morphology, flooding, and water quality. Hydrology impacts are evaluated in terms of their context, intensity, and duration, and whether the impacts are considered to be beneficial or adverse.

Channel Morphology

The analysis examines potential changes to channel morphology (channel depth, position, and streamflow) as a result of the three alternatives. This section addresses existing and potential future restrictions to streamflow, potential repositioning of the channel bed, potential channel bed scour and bank erosion or instability, flow rates, and sediment transport mechanics.

Floodplain

National Park Service policy is to protect natural floodplain values and functions, and to minimize risk to life or property by avoiding the use of the regulatory floodplain whenever there is a feasible alternative. Impacts are evaluated in this section based on the potential to avoid loss of life and property during major floods.

The National Park Service manages floodplains in accordance with Executive Order 11988, Floodplain Management, and the National Park Service Special Directive 93-4 (*Floodplain Management Guidelines* [NPS 1993a]). The regulatory floodplain is defined as the 100-year, 500-year, or maximum possible flood, depending on the type of activity and the amount of risk inherent in the nature of flooding at a location. Generally, the regulatory flood is the 100-year flood for most park functions in non-flash-flood environments. For critical facilities such as schools, hospitals, and large fuel-storage facilities, the regulatory floodplain is defined as the 500-year floodplain in non-flash-flood areas. Facilities such as picnic areas and day-visitor parking are exempt from the National Park Service guidelines because they are often located near water for the enjoyment of visitors and do not involve overnight occupation.

When there is no practicable alternative to placing facilities in a floodplain, National Park Service policy permits the use of the floodplain when there are compelling reasons for doing so, when the level of impact to natural floodplain processes is acceptable, and when mitigation is provided to protect human life and property. A statement of findings must be written to document a decision to place facilities within a floodplain.

This section qualitatively analyzes the impacts or benefits to the river's floodplain due to removal of Cascades Diversion Dam. For this qualitative assessment, the removal of streamflow impediments was determined to be beneficial to the floodplain and protection of the river channel.

Water Quality

This section identifies potential effects on water quality associated with project activities, such as the location of staging areas near the Merced River, and the use of lubricants and fuels in equipment.

Wetlands

Wetlands and riparian areas are relatively rare in the context of the entire landscape. Modification of even small wetland areas induces effects that are proportionally greater than elsewhere in an ecosystem (Graber 1996).

The National Park Service is committed to minimizing wetland loss. The wetland protection mechanisms used by the National Park Service include Executive Order 11990, Protection of Wetlands; the National Park Service's Director's Order #77-1, Wetland Protection, and its accompanying Procedural Manual #77-1; Clean Water Act Section 404; and the "no net loss" goal outlined by the White House Office on Environmental Policy in 1993. Executive Order 11990 requires that leadership be provided by involved agencies to minimize the destruction, loss, or degradation of wetlands. Director's Order #77-1 and Procedural Manual #77-1 provide specific procedures for carrying out the executive order. Section 404 of the Clean Water Act authorizes the U.S. Army Corps of Engineers to grant permits for construction and disposal of dredged material in waters of the United States. Wetland impacts were estimated using wetland-specific data collected in the field during the spring of 2001 and summer of 2002. Wetland data were compared with each alternative to determine the area of potential effect.

Vegetation

Impacts on vegetation communities are assessed in terms of duration, type, and intensity in site-specific, parkwide, and regional contexts. Two primary parameters are used to evaluate the intensity of impacts on vegetation: (1) the size and continuity of the plant community, and (2) the natural structure, productivity, diversity (integrity), and rarity of the plant community.

Wildlife

This section addresses the effects of alternatives on wildlife and their habitat. Nearly all wildlife concerns can be addressed by considering the effects of the alternatives on wildlife habitat as represented by general vegetation types. The relationship between vegetation impacts and effects on wildlife is described within this section.

Impacts on wildlife are assessed in terms of changes in the amount and distribution of wildlife habitat, the size and connectivity of habitat, the integrity of the site (including past disturbance), the potential for habituation of wildlife to humans, and the relative importance of habitats.

Special-Status Species

Wildlife

The impact evaluation for special-status wildlife species for each alternative is based on the following: (1) the possibility of a species or its preferred habitat types to occur in areas expected to be affected; (2) the direct loss of habitat or individuals; (3) the partial loss of habitat due to habitat modification; and (4) the species' sensitivity to disturbance resulting from human activities that could cause species to abandon currently occupied habitat or deter them from occupying suitable habitat.

Vegetation

The assessment of potential impacts to special-status plant species is based on comparisons between the No Action Alternative and each of the action alternatives. Impacts are evaluated considering species' sensitivity to impacts (based on rarity, resilience, size of population, and extent of species throughout the park); location of species in proximity to new disturbance; and mitigation measures applied as appropriate for the species and the site.

Air Quality

The air quality impact assessment herein evaluates the effect of project activities on air pollutant emissions and concentrations. Air quality impacts are evaluated in terms of their context, intensity, and duration, and whether the impacts are considered to be beneficial or adverse.

The air quality impact assessment involves the identification and qualitative description of the types of activities associated with the Cascades Diversion Dam Removal Project that could affect air quality, corresponding emissions sources and pollutants, and relative source strengths. Based on the relative source strengths, this qualitative assessment was performed to determine the potential for higher pollutant emissions or concentrations, taking into account the frequency, magnitude, duration, location, and reversibility of the potential impact. In addition, regional pollutant transport issues are evaluated in the context of regional cumulative impacts.

Neither the National Park Service nor the Mariposa County Air Pollution Control District has established emissions-based criteria for evaluating the significance of project implementation impacts. Without such recommendations, the typical approach is to qualitatively evaluate the significance of temporary project implementation impacts. The analysis of effects herein is qualitative, and professional judgment has been applied to reach reasonable conclusions as to the context, intensity, and duration of potential impacts. When possible, mitigation measure(s) are incorporated into the project to reduce the intensity of adverse effects.

Noise

The noise impact assessment involves the identification and qualitative description of the types of actions that could affect the ambient noise environment, corresponding noise sources, relative source strengths, and other characteristics. Based on the relative source strengths, a qualitative assessment was performed to determine the potential for a substantial increase in ambient noise levels in areas where there is natural quiet. Assessments were also performed where noise-sensitive uses are located or would expose persons to excessive noise levels, taking into account the frequency, magnitude, duration, location, and reversibility of the potential impact.

Cultural Resources

The method of impact analysis described below applies to three types of cultural resources: archeological sites, ethnographic resources, and cultural landscape resources (including individually significant historic structures).

Section 106 of the National Historic Preservation Act of 1966, as amended, requires a federal agency to take into account the effects of undertakings on properties included in, eligible for inclusion in, or potentially eligible for inclusion in the National Register of Historic Places, and provides the Advisory Council on Historic Preservation the reasonable opportunity to comment. A Programmatic Agreement was developed among the National Park Service at Yosemite, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation, in consultation with American Indian tribes and the public, that guides the park's actions in regard to historic properties.

The methodology for assessing impacts to historic resources is based on stipulations of the Programmatic Agreement. This methodology includes: (1) establishing an Area of Potential Effect; (2) assessing the background information regarding historic properties within this area and conducting any necessary surveys, inventories, and resource evaluations; (3) comparing the location of the impact area with that of resources listed, eligible, or potentially eligible for listing in the National Register of Historic Places; (4) identifying the extent and type of effects; (5) assessing those effects according to procedures established in the Advisory Council on Historic Preservation's regulations; and (6) considering ways to avoid, reduce, or mitigate adverse effects.

Cultural resource impacts in this document are described in terminology consistent with the regulations of the Council on Environmental Quality, and in compliance with the requirements of both the National Environmental Policy Act and Section 106 of the National Historic Preservation Act.

Mitigation of Impacts

The National Environmental Policy Act also calls for a discussion of the appropriateness of mitigation and an analysis of the effectiveness of mitigation. A reduction in the intensity of an impact due to mitigation is an estimate of the effectiveness of this mitigation under the National Environmental Policy Act, but does not suggest that the level of effect, as defined by implementing regulations for Section 106 of the National Historic Preservation Act, is similarly reduced. Although adverse effects under Section 106 may be mitigated, and the National Park Service may satisfy the Section 106 obligation, the effects would still be considered adverse under the National Historic Preservation Act.

Treatment for National Environmental Policy Act purposes in this document is based on the Programmatic Agreement and includes the avoidance of adverse effects or the application of one or more standard professional practices, as described in Stipulations VII (C) and VIII of the Programmatic Agreement. Avoidance strategies may include the application of the *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation* (USDOI 1983), design methods such as vegetation screening when placing new facilities in a historic district, and the development of guidelines to ensure compatibility between new and existing facilities. Stipulation VIII of the Programmatic Agreement requires the National Park Service notify the State Historic Preservation Officer, American Indian tribes, and certain members of the public of its decision to implement standard mitigation measures, as described in Stipulation VIII (A) for individual actions having an adverse effect on historic properties.

Archeological Resources

Archeological resources are typically considered eligible for inclusion in the National Register of Historic Places under criterion d of 36 Code of Federal Regulations Part 60, for the information they have or may be likely to yield.

Any change in the physical attributes of an archeological site is considered irreparable, adverse, and permanent. Adverse impacts to archeological resources most often occur as a result of earthmoving activities within an archeological site, soil compaction or increased erosion, unauthorized surface collection, or vandalism. Beneficial impacts to archeological resources can occur when ongoing impacts, which would otherwise continue to degrade archeological resources, are reduced or arrested due to changes in visitor use patterns or management practices in the vicinity of archeological resources. Direct impacts can occur as a result of grading, trenching, or other activities that damage the structure of an archeological site. Indirect impacts can occur as a result of increasing visitor activity or management actions in the vicinity of an archeological site, leading to such occurrences as artifact collection, accelerated soil compaction, or erosion.

The intensity of impact to an archeological resource would depend upon the potential of the resource to yield important information, as well as the extent of the physical disturbance or degradation. For example, major earthmoving at an archeological site with low data potential might result in a minor adverse impact. Negligible impacts would be barely perceptible and not measurable and would usually be confined to archeological sites with low data potential. Minor impacts would be perceptible and measurable and would remain localized and confined to archeological site(s) with low to moderate data potential. Moderate impacts would be sufficient to cause a noticeable change and would generally involve one or more archeological sites with

moderate to high data potential. Major impacts would result in substantial and highly noticeable changes, involving archeological site(s) with high data potential.

For archeological resources, mitigation includes avoiding sites through project design or recovering information that makes the sites eligible for inclusion in the National Register of Historic Places. According to Stipulation VII (C) of the Programmatic Agreement, impacts to archeological resources are not considered adverse for purposes of Section 106 of the National Historic Preservation Act if data recovery is carried out in accordance with the *Archeological Synthesis and Research Design* (Hull and Moratto 1999).²

Ethnographic Resources

Ethnographic resources are considered eligible for inclusion in the National Register of Historic Places as traditional cultural properties (or places) when: (1) a district, site, building, structure, or object is rooted in a community's history and is important for maintaining the continuing cultural identity of the community; and (2) the property(ies) meet National Register criteria for significance and integrity.

Impacts to ethnographic resources occur as a result of changes in the physical characteristics, access to, or use of resources, such that the cultural traditions associated with those resources are changed or lost. Beneficial impacts can occur when intrusive facilities or visitor or management activities are removed from a traditional use area; when ecological conditions are improved at a gathering area such that the traditionally used resource is enhanced; or when access for American Indian people is enhanced. Adverse impacts occur when physical changes to a traditionally used resource or its setting degrade the resource itself, or degrade access to or use of a resource.

Impacts are considered short term if they represent a temporary change in important vegetation or temporarily restrict access to an important resource, and do not disrupt the cultural traditions associated with that resource for a noticeable period of time, or alter the characteristics for which they are eligible for listing in the National Register. They are considered long term if they involve a change in important vegetation or cultural features, add a new facility or increase visitor use in a way that would change the physical character of or access to a resource for a noticeable period of time, or alter the characteristics for which the resources are eligible for listing in the National Register. This period of time would vary by resource type and traditional practitioners. These long-term changes would disrupt cultural tradition(s) associated with the affected resource, but the disruption would not alter traditional activities to the extent that the important cultural traditions associated with the resource are lost. Permanent impacts to ethnographic resources would involve irreversible changes in important resources such that the ongoing cultural traditions associated with those resources are lost.

The intensity of impacts to an ethnographic resource would depend on the importance of the resource to an ongoing cultural tradition, as well as the extent of physical damage or change. Negligible impacts would be barely perceptible and not measurable and would be confined to a small area or single contributing element of a larger National Register district (such as the ethnographic landscape). Minor impacts would be perceptible and measurable and would remain

² Under the Advisory Council on Historic Preservation's revised regulations of June 17, 1999 (36 CFR 800, Protection of Historic Properties; Final Rule and Notice), data recovery is considered to be an adverse effect. However, according to part 800.3 (A)(2) of these regulations, provisions of programmatic agreements in existence at the effective date of the new regulations remain in effect.

localized and confined to a single contributing element of a larger National Register district. Moderate impacts would be sufficient to cause a change in a significant characteristic of a National Register district or property and/or would generally involve a small group of contributing elements in a larger National Register district. Major impacts would result in substantial and highly noticeable changes in significant characteristics of a National Register district or property and/or would involve a large group of contributing elements in a larger National Register district and/or an individually significant property.

The National Park Service would continue to consult with culturally associated American Indian tribes according to stipulations of the Programmatic Agreement, as well as specific agreements such as the October 17, 1997 “Agreement Between the National Park Service, Yosemite National Park, and the American Indian Council of Mariposa County, Inc. for Conducting Traditional Activities” to develop appropriate strategies to mitigate impacts on ethnographic resources. Such strategies could include identification of and assistance in providing access to alternative resource gathering areas, continuing to provide access to traditional use or spiritual areas, and screening new development from traditional use areas.

Cultural Landscape Resources, Including Individually Significant Historic Sites and Structures

Impacts to cultural landscape resources result from physical changes to significant characteristics of a resource or its setting. Beneficial impacts can occur as a result of restoration or rehabilitation of resources, or removal of incompatible or noncontributing facilities. Direct adverse impacts generally occur as a result of modifying a significant characteristic of a historic structure or landscape resource, removing a significant structure or landscape resource, or adding new, incompatible facilities in proximity to a historic site or structure. Indirect adverse impacts can also occur following project completion and are generally associated with changes in historic vegetation or continued deterioration of historic structures. They are considered indirect impacts as they are not directly associated with project construction, but rather result from increased visitor use or changes in the management of resources fostered by the project.

Impacts to historic structures and cultural landscape resources are considered short term if they involve activities such as temporary removal of vegetation or other contributing resources, road closures, or prescribed burns, where the impacts are noticeable for a period of from one to five years. Other examples of short-term impacts to historic structures include constructing scaffolding surrounding a building during rehabilitation work, or minor deterioration in historic fabric that is repairable as part of routine maintenance and upkeep. Impacts are considered long term if they involve a reversible change, lasting from five to 20 years, in a significant characteristic of a historic structure or landscape. These changes could include such actions as alteration of contributing resources or construction of an incompatible building addition or adjacent facility. Permanent impacts to a historic structure or landscape resources would include irreversible changes in significant characteristics, such as removal of contributing resources, restoration of natural systems and features, irreversible removal of historic fabric that changes the historic character of a property, or demolition of a historic structure.

Negligible impacts would be barely perceptible and not measurable and would be confined to small areas or a single contributing element of a larger National Register district. Minor impacts would be perceptible and measurable but remain localized and confined to a single contributing element of a larger National Register district. Moderate impacts would be sufficient to cause a

change in a significant characteristic of an individually significant historic structure or would generally involve a single or small group of contributing elements in a larger National Register district. Major impacts would result from substantial and highly noticeable changes in significant characteristics of an individually significant historic structure, or would involve a large group of contributing elements in a National Register district.

Mitigation measures for historic structures and cultural landscape resources include measures to avoid impacts, such as rehabilitation and adaptive reuse, designing new development to be compatible with surrounding historic resources, and screening new development from surrounding historic resources. In situations where a historic structure was proposed for removal, the National Park Service would first consider options for relocating the structure to another location in the park for adaptive reuse. Standard mitigation measures, as defined in the Programmatic Agreement, include documentation according to standards of the Historic American Buildings Survey/Historic American Engineering Record, as defined in the Re-Engineering Proposal (October 1, 1997). The level of this documentation, which includes photography and a narrative history, would depend on the significance of a resource (national, state, or local) and the nature of the resource (an individually significant structure, contributing elements in a cultural landscape or historic district, etc.). When a historic structure is slated for demolition, architectural elements and objects may be salvaged for reuse in rehabilitating similar structures, or they may be added to the park's museum collection. In addition, the historical alteration of the human environment and reasons for that alteration would be interpreted to park visitors.

Social Resources

Transportation

This impact assessment focuses on the effect of temporary changes to the roadway system and parking spaces on traffic volumes and associated traffic flow, access and circulation, and safety conditions. It is assumed that vehicle access past the dam area would be maintained during and after dam removal.

The analysis of effects is based on professional transportation engineering judgment. Relative to the No Action Alternative (Alternative 1), the action alternatives (Alternatives 2 and 3), which include complete or partial dam removal, would affect traffic flow, access and circulation, and safety during project work. Transportation impacts are evaluated in terms of their context, duration, and intensity, and whether the impacts are considered to be beneficial or adverse.

Traffic Flow Conditions

This section assesses potential changes in traffic volumes associated with the dam removal (e.g., workers and vehicular activities). Changes in traffic volumes are judged as to whether they would substantially change the levels of congestion on the roadway system serving Yosemite National Park.

Traffic Access and Circulation

This section assesses potential changes to the road network in the area affected by dam removal (e.g., realignment of El Portal Road to create a staging area). Changes to roads are judged as to whether they would substantially change vehicle access and circulation patterns in the affected area.

Traffic Safety/Conflicts

This section assesses potential changes in parking facilities associated with dam removal (i.e., displacement of parking spaces to maintain traffic flow past the staging area). Changes to parking facilities are judged as to whether decreased parking would substantially affect the potential for traffic conflicts.

Scenic Resources

The overriding management purpose of any national park, as defined by the National Park Service 1916 Organic Act, is to conserve the scenery and natural and historic objects. Following this direction, the National Park Service determined impacts on scenic resources by examining the potential effects of the Cascades Diversion Dam Removal Project on both the physical component (any change to the landscape character and/or features) and with respect to how that change is experienced (any change in visibility, viewpoints, etc.).

Impacts of the project on scenic resources are examined and determined by:

- Comparing the existing visual character of the landscape in terms of the color, textural scale, and formal attributes of landscape components and features, and the degree to which project actions would affect (i.e., contrast or conform with) that character
- Analyzing changes in experiential factors, such as whether a given action would result in a visible change, the duration of any change in the visual character, the distance and viewing conditions under which the change would be visible, and the number of viewers that would be affected

Scenic resources impacts consist of substantial changes that would alter (1) existing landscape character, whether foreground, intermediate ground, or background, and be visible from viewpoints the National Park Service has established as important; (2) access to a historically important viewpoints or sequence of viewpoints; or (3) the visibility of a viewpoint or sequence of viewpoints. The effect of air quality on scenic resources, specifically visibility, is examined in the Air Quality section.

Recreation

This analysis evaluates the quality of recreation opportunities in terms of how they might be altered as a result of the alternatives. Developing a quantitative analysis of potential effects on recreation is not feasible. Analysis of effects is therefore qualitative, and professional judgment was applied to reach reasonable conclusions as to the context, intensity, and duration of potential impacts.

Yosemite National Park offers a broad spectrum of recreation opportunities, including access to and availability of such activities as use of non-motorized watercraft (e.g., rafts, inner tubes, kayaks), swimming and wading, hiking, backpacking, camping, rockclimbing, fishing, sightseeing, photography, nature study, bicycling, and stock use. In addition, every individual visitor to Yosemite brings unique expectations, and thus each has a unique experience. As a result, the environmental assessment identifies, where possible, how the quality of the experience would change as a result of removal of Cascades Diversion Dam.

Assumptions that frame the analysis included the following:

- Visitor demand will increase over existing levels and will be the same among all of the alternatives
- There will be no change to visitor access by private vehicle to the park

Analysis was based on whether there was a complete loss of a recreation opportunity, a change in access to or availability of a recreation opportunity, or a change in the aggregate of recreation opportunities for the visitor. This analysis evaluates how the alternatives would interact with all independent and group opportunities available between Yosemite Valley and El Portal, such as floating, swimming and wading, hiking, backpacking, camping, rockclimbing, fishing, sightseeing, photography, nature study, and bicycling.

Orientation and Interpretation

This analysis evaluates the quality of orientation and interpretation opportunities in terms of how they might be altered as a result of the alternatives. Developing a quantitative analysis of potential effects on orientation and interpretation is not feasible. Analysis of effects is therefore qualitative, and professional judgment was applied to reach reasonable conclusions as to the context, duration, and intensity of potential impacts.

Yosemite National Park offers a broad spectrum of orientation and interpretation opportunities, including educational interpretation programs and information resources used to plan visits. As a result, the environmental assessment identifies, where possible, how the quality of orientation and interpretation opportunities would change as a result of removal of Cascades Diversion Dam.

Assumptions that frame the analysis included the following:

- Visitor demand will increase over existing levels and will be the same among all of the alternatives
- There will be no change to visitor access by private vehicle to the park

Analysis was based on whether there was a complete loss of a orientation and interpretation opportunity, a change in access to or availability of an orientation and interpretation opportunity, or a change in the aggregate of orientation and interpretation opportunities for the visitor.

Socioeconomics

The socioeconomic impact analysis qualitatively evaluates the effects of project alternatives on the regional economy. Due to the structure of the local economic relationships and the nature of the dam removal activities, these impacts are addressed in terms of the three-county region as a whole, and not at the individual county level. Professional judgment was applied to reach reasonable conclusions as to the context, duration, and intensity of potential impacts.

The analysis considered both direct and secondary project-related spending effects. *Direct* effects represent the immediate spending within the sector of the economy where the initial stimulus occurs. Secondary effects include indirect effects and induced effects. *Indirect* effects represent the impact of the initial stimulus on the economy as a result of changes in business spending. *Induced* effects are the impacts of the initial stimulus on the economy from changes in personal

consumption (as a result of changes in employee income). Generally, secondary spending effects increase direct spending effects by about 45 percent (NPS 2000a). Total project-related spending is the combination of both direct and secondary spending effects.

The estimated cost of dam removal for the action alternatives is provided in 2003 dollars. Project-related economic output for the affected region is provided in 2000 dollars. The estimated project costs for the alternatives were deflated to 2000 dollars using the Consumer Price Index for All Urban Consumers (1982-84=100) to adjust for inflation (U.S. Bureau of Labor Statistics 2002).

Park Operations and Facilities

For purposes of this analysis, an alternative is assumed to have an impact (negative or beneficial) on park operations and facilities if it:

- Results in direct changes to park operation, facilities, or staffing requirements or policies associated with park operations
- Causes indirect effects on park operations staffing, such as effects on utility and roadway infrastructure, flooding, and impacts on provision of utilities, especially potable water and sewer services

Alternative 1 – No Action

The No Action Alternative maintains the status quo at Cascades Diversion Dam, as described in Chapter III, Affected Environment. It provides a baseline from which to compare the action alternatives, to evaluate the magnitude of proposed changes, and to measure the environmental effects of those changes.

Natural Resources

Geology, Geologic Hazards, and Soils

Analysis

Under Alternative 1, dam failure could be sudden or could occur over a course of years or decades. This failure could occur in either a single event during high river flows or could occur gradually, as the dam and attendant structures degrade from continued scour. Dam failure represents a public safety hazard because debris, including timbers and concrete, would be released into the river and carried downstream, potentially causing injury. Uncontrolled dam failure could also cause unpredictable riverflows that destabilize and erode banks, resulting in soil loss, an undermining of trails and roads, endangerment of the utility lines beneath El Portal Road, and damage to downstream natural and cultural resources and facilities. Erosion caused by diverted floodwaters would result in local, long-term, moderate, adverse impacts to soil resources.

Under Alternative 1, geologic hazards could cause further structural damage to Cascades Dam Diversion and contribute to greater structural degradation that could accelerate the eventual failure of the dam structure. Cascades Diversion Dam would continue to be subjected to structural damage due to earthquakes. The dam is located in an area of moderate seismicity, and earthquakes from several remote sources that could trigger groundshaking sufficient to cause observable ground movement at the dam site. A significant earthquake would likely damage the historic structural elements (i.e., crack concrete dam components and dislodge the timber crib) rather than cause their immediate failure. Earthquake-induced damage could accelerate degradation of the structural supports and contribute to the eventual failure of the dam. Groundshaking could also consolidate the sand and gravel deposits underlying the dam, leading to further structural damage. This would be a local, long-term, moderate, adverse impact. It is important to note that the dam has withstood numerous small and some relatively large earthquakes over the past 83 years without significant damage or failure.

As in the past, Cascades Diversion Dam and the attendant structures would be subject to damage from debris generated during rockfalls along the shear cliffs of the Merced River gorge. A rockfall event, although relatively infrequent, could deposit boulders or talus in the impoundment or at the crest of the dam. Talus accumulation or boulders in the impoundment behind the dam could redirect riverflows laterally towards the riverbank and result in bank erosion and bank scour. Debris deposited on the dam structure during a rockfall is not likely to result in sudden dam failure, but the forces on the structure could cause damage, especially to the concrete abutments and the intake structure. Damage to the dam from a rockfall could accelerate degradation and eventual failure. Under Alternative 1, rockfall events would result in a local, long-term, minor, adverse effect on public health and safety.

Retrieval of dam materials scattered downstream due to continued degradation or dam failure would require multiple ingress and egress points for equipment and personnel, potentially destabilizing the riverbank in locations between Cascades Diversion Dam and Cascades Picnic Area. Under extreme high flows, dam debris could be transported as far downstream as El Portal. Debris retrieval activities would result in short-term impacts to soil resources and could include excessive erosion, soil compaction, and loss of topsoil caused by diverted floodwaters following dam failure. Dam debris retrieval activities would result in local, short-term, moderate, adverse impacts to soil resources.

Continued dam degradation and dam failure and the subsequent deposition of sediment would benefit floodplain soils by providing a sediment source that would eventually settle out along the river and provide a substrate for development of a soils horizon. However, the amount of sediment that would be released from behind the dam would be relatively insignificant compared to the overall area of expected deposition (the braided river reach at Cascades Picnic Area) and the amount of sediment that is typically transported downstream on a continual basis. The contribution of sediment available for soil development in the area of the dam and reservoir is considered negligible.

Soil resources throughout the remainder of the Merced River corridor would be unaffected by this alternative.

Summary of Alternative 1 Impacts. Continued degradation and eventual failure of the dam and retrieval of dam debris would cause bank destabilization, erosion, and soil loss, resulting in local, short- and long-term, moderate, adverse impacts to soil resources. Under Alternative 1, rockfall events would result in a local, long-term, minor, adverse effect on public health and safety.

Cumulative Impacts

Cumulative impacts to geological resources discussed herein are based on analysis of past, present, and reasonably foreseeable future actions in the Yosemite region in combination with potential effects of this alternative. The projects identified below include only those projects that could affect geological resources within the river corridor or vicinity.

Development projects intended to serve park visitors in Yosemite National Park have included hotels, visitor centers, campgrounds, and bridges, with associated roads and parking lots. In addition, facilities required to support park infrastructure, including employee housing, utility facilities, maintenance yards, and supply storage areas, have been developed throughout the park. As the popularity of Yosemite attracts a growing number of visitors, the number and magnitude of such projects has increased to meet visitor demand. Past facility development has occurred in areas that could be susceptible to damage from geologic hazards (rockfalls and seismic events) and has contributed to the overall degradation of soil resources in the park.

Rockfall hazards are being reduced through projects that relocate people and facilities away from rockfall hazard zones, such as the removal of units at Housekeeping Camp and Curry Village that are located within the talus slope zone, as identified in the *Yosemite Valley Plan* and the Curry Village Employee Housing Project. However, other projects could expose additional visitors to the risk of rockfalls, such as the Happy Isles to Vernal Falls Trail Reconstruction and the Lower Yosemite Fall Project. Additionally, rockfall hazards constitute a long-term adverse impact to park visitors, as multiple facilities are located in the talus slope and rockfall shadow zones. The

gorge area has experienced more rockfall incidences than any place in the park. Several of these have occurred along El Portal Road. Earthquakes are unavoidable and unpredictable and represent a potentially long-term, adverse impact to public health and safety. However, past, present, and reasonably foreseeable future actions would result in a local, long-term, minor, beneficial cumulative impact to public health and safety from geologic hazards, due to an overall reduction in the density of people and facilities in the talus slope zone.

Certain projects could result in increased degradation of soil resources, such as construction projects related to campgrounds, lodging, employee housing, and other facilities, as identified in the *Yosemite Valley Plan*, Briceburg Bridge Reconstruction, and Yosemite Motels Expansion. However, other projects related to habitat restoration (e.g., *Yosemite Valley Plan*, Cook's Meadow Ecological Restoration, and Eagle Creek Merced River Ecological Restoration) would have long-term, beneficial effects on soils. Although these types of projects may have slight site-specific, short-term, adverse effects (e.g., potential short-term construction erosion and soil loss), an objective of these projects is to restore and manage natural resources and reduce soil degradation. For example, full implementation of the *Yosemite Valley Plan* would restore approximately 177 acres of soil, of which approximately 136 acres would be high-value resource soils. The cumulative projects would result in a local, long-term, minor, beneficial, cumulative impact on soil resources.

Alternative 1 and the cumulative projects would result in a local, long-term, minor, beneficial impact to public safety in the project region, due to the overall reduction in the density of facilities in the talus slope and rockfall shadow zones. The local, long-term, minor, beneficial impact to soil resources under the cumulative projects would be somewhat diminished by the potential soil erosion and bank destabilization under Alternative 1, resulting in a net local, long-term, negligible, beneficial impact to soil resources.

Impairment

The No Action Alternative would result in a local, short- and long-term, moderate, adverse impact to soil resources in the immediate vicinity of Cascades Diversion Dam due to bank destabilization, erosion, and soil loss. Although the Merced River system and its geologic resources are key natural resources components within the Merced River gorge, the effect of this alternative on the riverbanks and soils would be localized between Cascades Diversion Dam and Cascades Picnic Area, and the effect would not be considered severe. The extent and quality of soil resources throughout the remainder of the Merced River corridor would remain unaffected by this alternative. Therefore, Alternative 1 would not impair geologic resources.

Hydrology, Floodplains, and Water Quality

Analysis

Under Alternative 1, the existing condition and placement of Cascades Diversion Dam would continue to adversely influence river hydrology and present a potential flood hazard. A dam, like any fixed structure in a river, can alter flow dynamics and result in localized morphologic changes to the bed and banks of the river. Cascades Diversion Dam constricts the floodplain of the Merced River in the immediate area of the dam, alters hydrologic flows, widens the river channel (to approximately twice its natural width), and impedes free-flow and fluvial processes (e.g., sediment transport). Alternative 1 would have a local, long-term, moderate, adverse impact on hydrologic processes that influence river morphology. However, when the dam fails of its own

accord under Alternative 1, river hydrology would be restored to more natural conditions, resulting in a local, long-term, moderate, beneficial impact on hydrologic processes.

Under Alternative 1, Cascades Diversion Dam would remain in its existing condition, without maintenance or repair. Serious damage to the timber overflow crest of the dam was sustained during the 1997 flood. Over the long term, Cascades Diversion Dam would continue to degrade and eventually fail, and dam materials and impounded sediments would be released and eventually collect downstream to the Cascades Picnic Area. Under extreme high flows, dam materials and impounded sediments could be transported as far downstream as El Portal. At the dam site, the channel would scour to a more natural condition, becoming narrower and deeper. As this occurs, the localized water table is expected to drop. Lateral movement of the channel or increased bank shear stress could increase erosion. Over time, the channel of the Merced River would stabilize. Depending on the flows at the time of dam failure, large pieces of the dam structure could restrict and divert flows, leading to bank erosion or riverbank scour between the dam and Cascades Picnic Area. Until flow reduced sufficiently to allow the pieces to be removed from the river after dam failure, bank erosion would continue and possibly threaten to expose and undermine the utility lines located under El Portal Road, adjacent to the river-right bank. Flows diverted by debris could cause the river to leave the channel and result in localized flooding on either side of the river. Due to the potential for dam failure and subsequent erosion and flooding, Alternative 1 would have a local, short-term, moderate, adverse impact on hydrologic processes. However, these adverse impacts would be somewhat outweighed by the long-term benefits associated with eliminating an impediment to free-flowing river conditions and eventual restoration of a more natural hydrologic regime after dam failure.

Under Alternative 1, continued degradation of the dam and eventual failure would result in temporarily substantial water quality impacts associated with bank erosion. Upon dam failure, the majority of impounded sediment would settle at Cascades Picnic Area. While it is estimated that the impoundment area contains approximately 15,000 to 20,000 cubic yards of sediment (including rocks/boulders), some of this material was present in the riverbed prior to dam construction, and it is likely that some of the impounded material would remain following dam failure, including the island upstream from the dam. Sediment deposition in the reach between the dam and the Cascades Picnic Area could build sandbars and increase floodplain characteristics (e.g., riparian vegetation). Because less than 1% of the impounded material is finer than 0.07 millimeter in diameter, any turbidity impact to the river from release of this material would likely be small. The largest increase of turbidity above background values (see Chapter III, Affected Environment, Alluvial Processes) would likely occur the first time the river flows through the sediments formerly impounded by the dam. This rise in turbidity would probably last on the order of a few hours. After the initial rise in turbidity, there could be smaller spikes in turbidity as riverflows pass through the impoundment region and gradually erode more sediment and expose the fine material. However, each successive turbidity spike should be smaller than the previous one, until the turbidity levels return to normal (USBR 2001). Downstream bank erosion resulting from dam deterioration and eventual failure would release additional sediment into the river and result in a greater turbidity impact than that associated with release of impounded sediments. Fine-grained materials would be transported downstream some distance and would likely settle out and deposit in areas of low energy, such as pools and downstream reservoirs (NPS 2001a). Solid structural materials from the dam would constitute less of a water quality impact. However, retrieval of dam debris would require multiple ingress and egress points for equipment and personnel, and the use of equipment along the river between Cascades Diversion Dam and

Cascades Picnic Area. Debris retrieval activities could dislodge sediment from the riverbed and banks, resulting in water quality impacts. Sediment and debris delivery to the river would continue if the dam remained and eventually failed; therefore, Alternative 1 would represent a local, short-term, moderate, adverse impact to water quality.

Summary of Alternative 1 Impacts. Alternative 1 would have a local, short-term, moderate, adverse impact on hydrologic processes and water quality, due to continued deterioration and eventual failure of the dam and subsequent debris retrieval activities. Over the long term, the failed dam would be removed and more natural river hydrology would be restored in this area, which would have a local, long-term, moderate, beneficial impact on hydrologic processes.

Cumulative Impacts

Cumulative effects to hydrologic processes are based on analysis of past, present, and reasonably foreseeable future actions occurring in the Merced River corridor in combination with potential effects of Alternative 1.

The Merced River has been historically affected by a variety of projects that have introduced obstructions into the river channel, modified the floodplain, and adversely affected water quality. Alterations to hydrology have occurred through development and use within the Merced River corridor since Euro-American settlement. Examples of projects that have had adverse effects on the hydrologic processes of the Merced River include placement of riprap, removal of large woody debris, and construction of bridges, dikes, flood walls, impoundments, dams, and buildings. Conversely, actions to restore riverbanks, remove impoundments and bridges, and limit visitor use to particular areas help to restore the natural riverflow and reduce bank erosion.

Removal of the Happy Isles Gauging Station Bridge (a *Yosemite Valley Plan* project) resulted in positive impacts on hydrologic processes by eliminating an unnatural impediment to the free flow of the Merced River, thereby enhancing floodplain values and natural hydrologic processes. The *Yosemite Valley Plan* calls for removal of three additional bridges that constrain flows of the Merced River (Sugar Pine, Stoneman, and Housekeeping), restoration to natural conditions of campgrounds located within the floodplain, and removal of facilities from the 100-year floodplain. However, *Yosemite Valley Plan* projects that involve construction of additional lodging, campsites, and other facilities could result in adverse impacts. Overall, the *Yosemite Valley Plan* would have a beneficial effect on river hydrologic processes and water quality.

The Merced River Plan protects river-related natural resources through the application of management elements, including the River Protection Overlay, management zoning, protection and enhancement of Outstandingly Remarkable Values, Section 7 determination process, and implementation of a Visitor Experience Resource Protection framework.

Other future projects include the Happy Isles Gauging Station Replacement Project, Eagle Creek Merced River Ecological Restoration, and Replacement/Rehabilitation of Yosemite Valley Main Sewer Line. Cumulatively, these projects are anticipated to have a beneficial impact on hydrologic processes and water quality of the Merced River.

While some of the past, present, and future projects in the Merced River watershed would ultimately remove constrictions to streamflows, enhance water quality, rehabilitate eroded streambanks, and reduce degradation of stream characteristics in the Merced River, others would

result in adverse water quality impacts and bank erosion through construction-related activities, such as the Curry Village Employee Housing, Lower Yosemite Fall, and Yosemite Lodge Area Redevelopment projects. Overall, the cumulative projects would result in a local, long-term, minor, beneficial impact to hydrologic processes and water quality.

The past, present, and future projects in the Merced River watershed, considered cumulatively with Alternative 1, would have a local, long-term, minor, beneficial impact to hydrologic processes and water quality. The long-term beneficial effects associated with dam failure under Alternative 1 would contribute to the beneficial cumulative effects, and largely offset the short-term adverse effects associated with the continued deterioration and eventual failure of the dam.

Impairment

Alternative 1 would have a local, short-term, moderate, adverse impact on hydrologic processes and water quality due to continued deterioration and eventual failure of the dam, but a local, long-term, moderate, beneficial impact on hydrologic processes associated with the ultimate removal of the dam. Although the Merced River system and its associated hydrologic resources are key natural resource components within the Merced River gorge, the adverse effects of this alternative on river hydrology would be primarily localized between Cascades Diversion Dam and Cascades Picnic Area (and potentially to El Portal under extreme high flows), temporary in duration, and largely offset by the long-term beneficial effects of ultimate dam removal. The short-term adverse effects of this alternative would not be considered severe. Therefore, Alternative 1 would not impair hydrologic resources within the Merced River corridor.

Wetlands

Analysis

Under Alternative 1, the existing condition and placement of Cascades Diversion Dam would continue to adversely influence the size, connectivity, and integrity of river-related wetlands in the vicinity of the dam, particularly palustrine forest, palustrine scrub shrub, and riverine habitats. A dam, like any fixed structure in a river, can alter flow dynamics and result in localized morphologic changes to the bed and banks and wetland habitats of the river. Cascades Diversion Dam constricts the floodplain of the Merced River in the immediate area of the dam, alters hydrologic flows, and widens the river channel (to approximately twice its natural width). In this section, the river is shallower and warmer, without the variety of riffles and deep pools needed to sustain natural aquatic life. Riverside vegetation overhanging the main channel is absent in many locations and contributes only minimal nutrients, organic matter, or shade to the riverine system. Palustrine forest wetlands along the riverbank are restricted to a narrow border along both shores. On the river-right shore, riparian vegetation is constricted between the river and the roadway. On the river-left, this zone is constricted between the widened channel in the impoundment and naturally steep topography. Reduction in the riparian band has increased bank erosion, resulting in a further loss of stabilized soils capable of supporting riparian species.

Cascades Diversion Dam restricts free flow of the Merced River and natural downstream sediment transport – a natural riverine process that builds bars (e.g., sandbars) that provide substrate for riparian vegetation. Although natural sediment transport in this reach of the river has been inhibited for over 80 years, downstream aggregation of sandbars still occurs, and riparian vegetation³ is intact. In the near term, Cascades Diversion Dam would remain in place,

³ Riparian vegetation through the gorge is naturally restricted by channel shape, slope, bed material, and flow.

and these adverse impacts on the palustrine forest, palustrine scrub shrub, and riverine habitats in the immediate vicinity of the dam would continue.

Cascades Diversion Dam would continue to degrade and eventually fail. Dam materials and sediments would be released downstream to the Cascades Picnic Area (or as far as El Portal under extreme high flows) and could affect riparian and aquatic resources, either during transport (e.g., large dam debris could remove riparian trees) or upon deposition. While it is estimated that the impoundment area contains approximately 15,000 to 20,000 cubic yards of sediment (including rocks/boulders), some of this material was present in the riverbed prior to dam installation, and it is likely that some of the impounded material would remain following dam failure, including the island upstream from the dam. Sediment deposition could have adverse or beneficial effects to downstream wetland resources. For instance, suspended sediments would temporarily reduce dissolved oxygen levels, and sediment and debris deposition could bury riparian species, resulting in individual death. This latter effect would also be temporary, because natural revegetation would occur. Conversely, sediment deposition could result in larger sandbars capable of supporting riparian vegetation – a potential beneficial effect. Depending on the flows at the time of dam failure, large pieces of the dam structure could restrict and divert flows, leading to bank erosion or riverbank scour between the dam and Cascades Picnic Area. Until flow reduced sufficiently to allow the pieces to be removed from the river after dam failure, bank erosion would continue and possibly threaten to expose and undermine wetland resources. Flows diverted by debris could cause the river to leave the channel and result in localized flooding on either side of the river. Bank erosion and retrieval of dam debris could result in local, short-term, negligible to moderate, adverse impacts for wetland resources.

At the dam site, the channel would be expected to scour to a more natural condition, becoming narrower and deeper. As this occurs, the localized water table is expected to drop, and existing riparian vegetation could transition to an upland community. Lateral movement of the channel or increased bank shear stress could increase erosion, which could also result in riparian loss. Although natural stabilization of the riparian and aquatic community would occur over time, restoration would not be complete for 10 or more years; therefore, this impact is considered a local, short- and long-term, minor to moderate, adverse effect on wetland and aquatic habitats.

Summary of Alternative 1 Impacts. In the near term, Cascades Diversion Dam would remain and would continue to adversely affect the size, connectivity, and integrity of wetlands in the immediate vicinity of the dam, particularly palustrine forest and riverine habitats. Cascades Diversion Dam would degrade and eventually fail. Dam materials and impounded sediments would be released downstream and could affect riparian and aquatic resources during transport (e.g., large dam debris could remove riparian trees), upon deposition, or during debris retrieval activities, resulting in a local, short-term, negligible to minor, adverse impact to wetland resources. Although natural stabilization of the riparian and aquatic community would occur over time, restoration would not be complete for 10 or more years; therefore, this impact is considered a local, long-term, minor to moderate, adverse effect on wetland and aquatic habitats.

Cumulative Impacts

Cumulative effects to wetland and aquatic resources discussed herein are based on analysis of past, present, and reasonably foreseeable future actions in the Merced River corridor in combination with potential effects of this alternative. The projects identified below include those

projects that have the potential to affect local wetland patterns (i.e., within the river corridor) as well as regional wetland patterns related to the Merced River.

Wetland and riparian systems of the Merced River corridor have been substantially altered by development and visitor activities. These changes have negatively influenced the size, form, and function of wetlands and the plants, wildlife, and aquatic species that inhabit them.

Implementation of the *Yosemite Valley Plan* is an example of an approved plan that could have adverse or beneficial effects on wetlands. Full implementation of the *Yosemite Valley Plan* would restore 141 acres of river-associated wetlands in Yosemite Valley – a long-term, major, beneficial effect. While some of the past, present, and future projects in the Merced River watershed could have short-term, construction-related, adverse impacts to wetland resources, such as the Curry Village Employee Housing, Lower Yosemite Fall, and Yosemite Lodge Area Redevelopment projects, overall the cumulative projects would increase the size, connectivity, and integrity of wetland resources within the watershed, resulting in a long-term, major, beneficial cumulative effect on wetland and aquatic resources. Although Alternative 1 would have a local, short-term, negligible to minor, adverse effect and a local, long-term, minor to moderate, adverse effect on wetland and aquatic habitats in the vicinity of the dam, the cumulative projects would overshadow the effects of Alternative 1, resulting in a net long-term, major, beneficial effect on wetland patterns within the Merced River corridor.

Impairment

Alternative 1 would result in a local, short-term, negligible, adverse impact and a local, long-term, minor to moderate, adverse impact to wetland and aquatic resources. Although the Merced River system and its related wetlands are key resources within Yosemite Valley, the effect of this alternative on wetland resources would be primarily localized, and the effect would not be considered severe. The extent and quality of riparian, wetland, and other riverine habitats throughout the remainder of this segment of the river would remain unaffected. Therefore, Alternative 1 would not impair wetland resources.

Vegetation

Analysis

The size, connectivity, and integrity of vegetation in the project area, particularly riparian vegetation, has been directly compromised by Cascades Diversion Dam, which constricts the floodplain of the Merced River in the immediate area of the dam and restricts vegetation to a narrow border. Riverside vegetation that overhangs the main channel is absent in many locations and contributes only minimal nutrients, organic matter, or shade to the riverine system. Reduction in the riparian band has increased bank erosion, resulting in a further loss of stabilized soils capable of supporting riparian species.

Cascades Diversion Dam restricts free flow of the Merced River and natural downstream sediment transport – a natural riverine process that builds bars (e.g., sandbars) that provide substrate for riparian vegetation. Although natural sediment transport in this reach of the river has been inhibited for over 80 years, downstream aggregation of sandbars still occurs, and riparian vegetation⁴ is intact. In the near term, Cascades Diversion Dam would remain in place, and these adverse impacts on riparian vegetation in the project area would continue.

⁴ Riparian vegetation through the gorge is naturally restricted by channel shape, slope, bed material, and flow.

Cascades Diversion Dam would continue to degrade and eventually fail. Dam materials and sediments would be released downstream to the Cascades Picnic Area (or as far as El Portal under extreme high flows) and could affect riparian habitats, either during transport (e.g., large dam debris could remove riparian trees) or upon deposition. While it is estimated that the impoundment area contains approximately 15,000 to 20,000 cubic yards of sediment (including rocks/boulders), some of this material was present in the riverbed prior to dam installation, and it is likely that some of the impounded material would remain following dam failure, including the island upstream from the dam. Sediment deposition could have adverse or beneficial effects to downstream vegetation. For instance, suspended sediments would temporarily reduce dissolved oxygen levels, and sediment deposition could bury riparian species, resulting in individual death. This latter effect would also be temporary, because natural revegetation would occur. Conversely, sediment and dam debris deposition could result in larger sandbars capable of supporting riparian vegetation – a potential beneficial effect. Depending on the flows at the time of dam failure, large pieces of the dam structure could restrict and divert flows, leading to bank erosion or riverbank scour between the dam and Cascades Picnic Area. Until flow reduced sufficiently to allow the pieces to be removed from the river after dam failure, bank erosion would continue and possibly threaten to expose and undermine riparian vegetation. Flows diverted by debris could cause the river to leave the channel and result in localized flooding on either side of the river, which could further affect local vegetation patterns. Bank erosion and retrieval of dam debris could result in local, short-term, negligible to moderate, adverse impacts on vegetation.

At the dam site, the channel would be expected to scour to a more natural condition, becoming narrower and deeper. As this occurs, the localized water table is expected to drop, and existing riparian vegetation could transition to an upland community. Lateral movement of the channel or increased bank shear stress could increase erosion, which could also result in riparian loss. Although natural stabilization of the riparian and aquatic community would occur over time, restoration would not be complete for 10 or more years; therefore, this impact is considered a local, long-term, minor, adverse effect on vegetation.

Summary of Alternative 1 Impacts. In the near term, Cascades Diversion Dam would remain and would continue to adversely affect the size, connectivity, and integrity of vegetation in the immediate vicinity of the dam, particularly palustrine forest and riverine habitats. Cascades Diversion Dam would degrade and eventually fail. Dam materials and impounded sediments would be released downstream and could affect downstream vegetation, especially riparian vegetation, during transport (e.g., large dam debris could remove riparian trees), upon deposition, or during debris retrieval activities, resulting in a local, short-term, negligible to moderate, adverse impact to vegetation. Although natural stabilization of river-associated vegetation would occur over time, restoration would not be complete for 10 or more years; therefore, this impact is considered a local, long-term, minor, adverse effect on vegetation.

Cumulative Impacts

Cumulative effects to vegetation resources discussed herein are based on analysis of past, present, and reasonably foreseeable future actions in the Merced River corridor in combination with potential effects of this alternative. The projects identified below include those projects that have the potential to affect local vegetation patterns (i.e., within the river corridor) as well as regional vegetation patterns related to the Merced River.

Vegetation within the Merced River corridor, especially riparian systems, have been substantially altered by development and visitor activities. These changes have negatively influenced the size, form, and function of vegetation communities and the plants, wildlife, and aquatic species that inhabit them. Implementation of the *Yosemite Valley Plan* is an example of an approved plan that could have adverse or beneficial effects on vegetation. While some of the past, present, and future projects in the Merced River watershed may have short-term, construction-related, adverse impacts on vegetation patterns, such as the Curry Village Employee Housing, Lower Yosemite Fall, and Yosemite Lodge Area Redevelopment projects, overall the cumulative projects would increase the size, connectivity, and integrity of vegetation within the watershed, resulting in a long-term, major, beneficial cumulative effect on vegetation. Although Alternative 1 would have a local, short-term, negligible to moderate, adverse effect and a local, long-term, minor, adverse effect on vegetation, the cumulative projects would overshadow the effects of Alternative 1, resulting in a net long-term, major, beneficial effect on vegetation patterns within the Merced River corridor.

Impairment

Alternative 1 would result in a local, long-term, negligible to moderate, adverse impact and a local, long-term, minor, adverse impact to vegetation. Although the Merced River system and its related vegetation are key resources within Yosemite Valley, the effect of this alternative on vegetation would be primarily localized, and the effect would not be considered severe. The extent and quality of vegetation throughout the remainder of this segment of the river would remain unaffected. Therefore, Alternative 1 would not impair vegetation resources.

Wildlife

Analysis

The size, connectivity, and integrity of native fish and wildlife habitat in the immediate vicinity of Cascades Diversion Dam, particularly the riparian corridor and aquatic environment of the Merced River, has been directly altered by the dam, which constricts the floodplain of the Merced River in the immediate area of the dam and alters hydrologic flows. Within the impoundment, the Merced River is approximately twice as wide as the natural channel upstream and downstream. In this section, the river is shallower and warmer, and lacks riffles and deep pools natural to the system. Riverside vegetation overhanging the main channel and the habitat it provides (e.g., roosting or perch sites, nesting habitat) is sparse in this reach of the river and contributes only minimal nutrients, organic matter, or shade to the riverine system. On the river-right shore, riparian vegetation is constricted between the river and El Portal Road. On the river-left, this zone is constricted between the widened channel in the impoundment and naturally steep topography. Reduction in the riparian band has increased bank erosion, resulting in a further loss of stabilized soils capable of supporting riparian vegetation and associated wildlife. Cascades Diversion Dam restricts free flow of the Merced River and may present a barrier to several species of fish during low flows. In the near term, Cascades Diversion Dam would remain in place, and these adverse impacts on wildlife habitat and fish passage during periods of low flow would continue.

Cascades Diversion Dam would continue to degrade and eventually fail. Dam materials and impounded sediments would be released downstream to the Cascade Picnic Area (or as far as El Portal under extreme high flows) and could temporarily affect aquatic resources, either during transport (e.g., large dam debris could directly impact individual species) or upon deposition.

While it is estimated that the impoundment area contains approximately 15,000 to 20,000 cubic yards of sediment (including rocks/boulders), some of this material was present in the riverbed prior to dam installation, and it is likely that some of the impounded material would remain following dam failure, including the island upstream from the dam. Downstream sediment deposition could have adverse or beneficial effects on downstream fish and wildlife habitats. For instance, suspended sediments would temporarily reduce dissolved oxygen levels, which could lead to suffocation of aquatic invertebrates. Conversely, sediment deposition could result in larger sandbars capable of supporting riparian vegetation, increasing wildlife habitat – a potential beneficial effect. Depending on the flows at the time of dam failure, large pieces of the dam structure could restrict and divert flows, leading to bank erosion or riverbank scour between the dam and Cascades Picnic Area that could further affect local fish and wildlife and their habitat. Until flow reduced sufficiently to allow the pieces to be removed from the river after dam failure, bank erosion would continue and possibly threaten to expose and undermine riparian wildlife habitats adjacent to the river-right bank. Flows diverted by debris could cause the river to leave the channel and result in localized flooding on either side of the river, which could further affect local fish and wildlife patterns. Bank erosion and retrieval of dam debris could result in local, short-term, negligible to moderate, adverse impacts on wildlife.

Dam failure would eliminate approximately 2.5 acres of unnatural slack-water aquatic habitat upstream of the dam. At the dam site, the channel would scour to a more natural condition, becoming narrower and deeper. Water temperature through this reach would decrease, and oxygen levels would be expected to increase (generally a beneficial effect for aquatic species). Lateral movement of the channel or increased bank shear stress could increase erosion, which could also result in loss of riparian wildlife habitat. Over time, the channel of the Merced River would stabilize, and riparian recolonization would occur. This area would revert to a more natural, high-velocity habitat (similar to existing conditions upstream of the impoundment). Although natural stabilization of the riparian and aquatic community would occur over time, restoration would not be complete for 10 or more years; therefore, this impact is considered a long-term effect. Overall, Alternative 1 would result in a local, long-term, minor to moderate, adverse impact to aquatic wildlife habitat and associated native fish and wildlife.

Summary of Alternative 1 Impacts. In the near term, Cascades Diversion Dam would remain and would continue to adversely affect the size, connectivity, and integrity of wildlife and aquatic habitat in the immediate vicinity of the dam. Cascades Diversion Dam would degrade and eventually fail. Dam materials and impounded sediments would be released downstream and could have both beneficial and adverse effects on aquatic wildlife resources. Bank erosion and dam retrieval activities could result in local, short-term, negligible to moderate, adverse impacts on wildlife. Although natural stabilization of the riparian and aquatic community would occur over time, restoration would not be complete for 10 or more years; therefore, this impact is considered a long-term effect. Overall, Alternative 1 would result in a local, long-term, minor to moderate, adverse impact to aquatic wildlife habitat and associated native fish and wildlife.

Cumulative Impacts

Cumulative effects to native fish and wildlife discussed herein are based on analysis of past, present, and reasonably foreseeable future actions in the Merced River corridor in combination with potential effects of this alternative. The projects identified below include those projects that have the potential to affect local fish and wildlife patterns (i.e., within the river corridor) as well as regional fish and wildlife patterns related to the Merced River.

Native fish and wildlife communities have been manipulated almost since the inception of the park. Regional wildlife has been historically affected by logging, fire suppression, rangeland clearing, grazing, mining, draining, damming, diversions, and the introduction of non-native species. Fur-bearing mammals were trapped by park rangers until 1925; lions were considered dangerous predators and controlled through the 1920s; bears were artificially fed as a tourist attraction until 1940. Natural wildfires, with their generally beneficial effects on wildlife habitat, were routinely suppressed until 1972 (Wuerthner 1994). Past and ongoing activities include recreational use and installation of dams, diversion walls, bridges, roads, pipelines, riprap, buildings, campgrounds, and other recreational features.

Implementation of the *Yosemite Valley Plan* is an example of a project that could have adverse or beneficial effects on wildlife. Full implementation of the *Yosemite Valley Plan* would restore 141 acres of river-associated wildlife habitat in Yosemite Valley. While some of the past, present, and future projects in the Merced River watershed may have short-term, construction-related, such as the Curry Village Employee Housing, Lower Yosemite Fall, and Yosemite Lodge Area Redevelopment projects, adverse impacts to wildlife resources, overall the cumulative projects would increase the size, connectivity, and integrity of native fish and wildlife habitat within the watershed, resulting in a long-term, minor to moderate, beneficial cumulative effect for wildlife. Therefore, past, present, and reasonably foreseeable future actions, in combination with Alternative 1, would have a net long-term, minor to moderate, beneficial effect on native fish and wildlife within the Merced River corridor.

Impairment

Alternative 1 would result in a local, short-term, negligible to moderate, adverse impact and a local, long-term, minor to moderate, adverse impact to native fish and wildlife resources. Although the Merced River system and its related fish and wildlife are key resources within Yosemite Valley, the effect of this alternative on wildlife resources would be primarily localized, and the effect would not be considered severe. The extent and quality of fish and wildlife and their habitats throughout the remainder of this segment of the river would remain unaffected. Therefore, Alternative 1 would not impair wildlife resources.

Special-Status Species

Analysis

Special-status species known or likely to occur in the immediate vicinity of Cascades Diversion Dam include Wawona riffle beetle and nine species of bats (refer to Chapter III, Affected Environment, and Appendix D, Special-Status Species Evaluation, for additional information). The following subsections discuss impacts of Alternative 1 on these species or their habitat.

Wawona Riffle Beetle and Harlequin Duck. Cascades Diversion Dam adversely affects habitat for Wawona riffle beetle and harlequin duck in the area of the impoundment by altering hydrology flows and patterns. Within the impoundment, the Merced River is approximately twice as wide as the natural channel upstream and downstream. In this section, the river is shallower and warmer, and lacks riffles, deep pools, and swift water natural to the system. Riverside vegetation overhanging the main channel and the shade it provides is sparse in this reach of the river. On the river-right shore, riparian vegetation is constricted between the river and El Portal Road. On the river-left, this zone is constricted between the widened channel in the impoundment and naturally steep topography. In addition, Cascades Diversion Dam presents an unnatural barrier to

the beetle's movement during low-flow conditions. In the near term, Cascades Diversion Dam would remain in place, and these minor to moderate, adverse impacts to the Wawona riffle beetle and harlequin duck would continue.

Cascades Diversion Dam would continue to degrade and eventually fail. Dam materials and impounded sediments would be released downstream to the Cascades Picnic Area (or as far as El Portal under extreme high flows) and could temporarily affect the aquatic environment, either during transport or upon deposition. While it is estimated that the impoundment area contains approximately 15,000 to 20,000 cubic yards of sediment (including rocks/boulders), some of this material was present in the riverbed prior to dam installation, and it is likely that some of the impounded material would remain following dam failure, including the island upstream from the dam. Water quality would be adversely affected in the short term during sediment transport, which could adversely affect (e.g., suffocation, habitat displacement) individuals, populations, or habitat for Wawona riffle beetle or harlequin duck. Downstream deposition could also affect existing riffles and pools that currently provide habitat for Wawona riffle beetle. Depending on the flows at the time of dam failure, large pieces of the dam structure could restrict and divert flows, leading to bank erosion or riverbank scour between the dam and Cascades Picnic Area, further affecting habitat for Wawona riffle beetle and harlequin duck. Until flow reduced sufficiently to allow the pieces to be removed from the river after dam failure, bank erosion would continue and possibly threaten to expose and undermine riparian vegetation adjacent to the river-right bank. Flows diverted by debris could cause the river to leave the channel and result in localized flooding on either side of the river, which could further affect local habitat for Wawona riffle beetle and harlequin duck. Retrieval of dam debris could result in local, short-term, negligible to moderate, adverse impacts on Wawona riffle beetle and harlequin duck habitat. Overall, dam failure is expected to have local, short-term, moderate, adverse impacts on individuals and/or habitat for Wawona riffle beetle that occur downstream of dam.

Dam failure would also eliminate approximately 2.5 acres of unnatural slack-water aquatic habitat upstream of the dam. At the dam site, the channel would scour to a more natural condition, becoming narrower and deeper. Water temperature through this reach would decrease, and oxygen levels would be expected to increase. The impoundment portion of the river would be returned to a more natural condition, which would include deeper riffles and pools as well as full connectivity to downstream portions of the river during periods of low flow, creating an overall local, long-term, minor to moderate, beneficial effect on Wawona riffle beetle by increasing habitat for the species.

Special-Status Species of Bats and California Spotted Owl. Although the dam is an unnatural feature within the Merced River, it is unlikely the continued existence of the dam would have a significant effect on any of the special-status bat species or California spotted owl expected to occur in the vicinity. Eventual dam failure and the release of sediment and debris would have a short-term effect on the Merced River and could temporarily disrupt individual bats and California spotted owl. However, this impact is considered minor and are not likely to significantly affect special-status bats.

Summary of Alternative 1 Impacts. In the near term, Cascades Diversion Dam would remain and would continue to adversely affect the size, connectivity, and integrity of habitat for Wawona riffle beetle and harlequin duck in the immediate vicinity of the dam, resulting in a continued minor to moderate, adverse impact on beetles and their habitat. Cascades Diversion Dam would

degrade and eventually fail, creating a local, short-term, moderate, adverse impact on individuals or habitat for Wawona riffle beetle and harlequin duck that occur downstream of the dam. In the impoundment area, eventual dam failure would return this area to a more natural condition, creating an overall local, long-term, minor to moderate, beneficial effect on Wawona riffle beetle and harlequin duck by increasing habitat for the species. Alternative 1 is unlikely to significantly affect special-status species of bats or the California spotted owl in the vicinity of Cascades Diversion Dam.

Cumulative Impacts

Cumulative effects to special-status species discussed herein are based on analysis of past, present, and reasonably foreseeable future actions in the Merced River corridor in combination with potential effects of this alternative. The projects identified below include those projects that have the potential to affect local special-status species (i.e., within the river corridor) as well as regional special-status species patterns related to the Merced River.

Natural habitats of special-status species have been manipulated almost since the inception of the park. Their habitats have been historically affected by logging, fire suppression, rangeland clearing, grazing, mining, draining, damming, diversions, the introduction of non-native species, and recreational features and use.

An example of a project that could have adverse or beneficial effects on special-status species includes the implementation of the *Yosemite Valley Plan*. Full implementation of the *Yosemite Valley Plan* would restore 141 acres of river-associated habitat in Yosemite Valley – a high-value habitat for these special-status species. Although the *Yosemite Valley Plan* and other cumulative projects, such as the Curry Village Employee Housing, Lower Yosemite Fall, and Yosemite Lodge Area Redevelopment projects, could have short-term adverse affects during implementation (e.g., disturbance of roosting bats during construction), full implementation of cumulative projects planned or approved within the watershed would have a long-term, moderate, beneficial cumulative effect on habitat for special-status species by enhancing habitat connectivity, size, and structure within Yosemite Valley and throughout the Merced River corridor. Therefore, past, present, and reasonably foreseeable future actions in combination with Alternative 1 could have a net long-term, moderate, beneficial effect on special-status species within the corridor of the Merced River.

Impairment

The No Action Alternative would result in both beneficial and adverse effects on Wawona riffle beetle and harlequin duck in the vicinity of Cascades Diversion Dam. Although the Merced River system and its related special-status species are key resources within Yosemite Valley, the effect of this alternative on special-status species would be primarily localized, and would not be considered severe. The extent and quality of habitat for special-status species throughout the remainder of this segment of the river would remain unaffected. Therefore, Alternative 1 would not impair special-status species or their habitats.

Air Quality

Analysis

Under Alternative 1, air quality would be adversely affected by both “fugitive” sources (i.e., emissions released by means other than through a stack or tailpipe) and by tailpipe emissions.

Although no action would be taken under Alternative 1, the National Park Service would continue to make minor repairs to attendant structures such as the screenhouse, concrete platform, and safety railing on the dam intake structure. Maintenance-related activities conducted prior to eventual dam failure would result in temporary increases in traffic and associated tailpipe emissions. It is likely that maintenance activities would be conducted using similar air quality best management practices as those described in Chapter II, Alternatives. Emissions related to ongoing maintenance activities could adversely affect regional air quality, but impacts would be both temporary and negligible relative to emissions generated by other vehicle traffic along El Portal Road.

Upon dam failure, the National Park Service would remove large debris from the river and banks, which would result in air quality effects. Such effects would be primarily related to use of equipment, vehicle trips to and from the area, and dust. Cascades Diversion Dam is located in a region that experiences exceedances of the state ozone and particulate matter (with diameters of 10 microns or less) emission standards. Debris removal activities would temporarily affect pollutant concentrations along the Merced River corridor downstream of the dam (primarily fugitive dust from debris removal activities and vehicle travel over paved surfaces that are heavily laden with earthen materials). These activities could generate substantial amounts of dust, including particulate with diameters of 10 microns or less, primarily from fugitive sources. Dust emissions would vary from day to day, depending on the level and type of activity, silt content of the soil, and the weather, and would be a local, short-term, moderate, adverse impact.

Debris removal would also result in tailpipe emissions associated with use of mobile debris removal equipment, worker commute trips, and truck trips to haul debris materials from the Merced River and its banks to appropriate recycling facilities or reuse sites. Vehicle trips associated with debris removal activities would generate emissions of ozone precursors, carbon monoxide, and particulate with diameters of 2.5 microns or less (criteria air pollutant emissions) as well as toxic air contaminants from use of diesel-powered equipment. Toxic air contaminants are less pervasive in the atmosphere than criteria air pollutants, but they are linked to short-term (acute) and long-term (chronic or carcinogenic) adverse human health effects. Toxic air contaminants do not have corresponding ambient air quality standards. The brief duration of debris removal activities would limit the potential for tailpipe emissions and diesel particulates to adversely affect local air quality. Depending on whether debris removal activities took place in close proximity to sensitive receptors (e.g., recreation users at Cascades Picnic Area), the adverse effects of these emissions could range from negligible to moderate. Therefore, emissions associated with maintenance activities prior to dam failure and debris removal after dam failure would result in a local, short-term, negligible to moderate, adverse impact to air quality. There would be no long-term impact on air quality under Alternative 1.

Summary of Alternative 1 Impacts. Emissions associated with maintenance activities prior to dam failure and debris removal after dam failure under Alternative 1 would result in a local, short-term, negligible to moderate, adverse impact to air quality. There would be no long-term impact on air quality under Alternative 1.

Cumulative Impacts

Cumulative effects to air quality discussed herein are based on analysis of past, present, and reasonably foreseeable future actions in the Merced River corridor in combination with potential effects of this alternative. The projects identified below are examples of projects that could affect air quality within the river corridor.

Since 1950, the population of California has tripled, and the rate of increase in vehicle-miles-traveled has increased six-fold. Air quality conditions within the park have been influenced by this surge in population growth and associated emissions from industrial, commercial, and vehicular sources in upwind areas. Since the 1970s, emissions sources operating within the park, as well as California as a whole, have been subject to local stationary-source controls and state and federal mobile-source controls. With the passage of time, such controls have been applied to an increasing number of sources, and the associated requirements have become dramatically more stringent and complex. In the 1980s, a Restricted Access Plan was developed for use when traffic and parking conditions in Yosemite Valley are overcongested. The plan has the effect of reducing the number of incoming vehicles and their related emissions until the traffic volume and parking demand in Yosemite Valley decrease sufficiently (as visitors leave the Valley) to stabilize traffic conditions. Implementation of the Yosemite Area Regional Transportation System and the Yosemite Valley Shuttle Bus Improvements also has the effect of reducing regional vehicle trips and associated air emissions.

The *Yosemite Valley Plan* proposes to enhance the quality of the visitor experience in Yosemite Valley by reducing automobile congestion and limiting crowding. It also proposes traffic management systems and options for the size and placement of parking lots, both within and outside of Yosemite Valley. Parking lot(s) outside the Valley could be used to intercept day visitors and shift those visitors to Valley-bound shuttle buses. Although the *Yosemite Valley Plan* would have a moderate adverse impact on air quality due to nitrogen oxide emissions from diesel buses through 2015, it would have a long-term, minor to moderate, beneficial impact with respect to emissions of volatile organic compounds, carbon monoxide, and particulate matter.

Short-term adverse impacts on air quality could result from many of the reasonably foreseeable projects planned or approved within the Merced River corridor, such as the Curry Village Employee Housing, Lower Yosemite Fall, and Yosemite Lodge Area Redevelopment projects. The adverse effects of these projects would be localized and short term in nature, and primarily related to construction-generated traffic on roadways serving the project sites. The intensity of the adverse effects from construction-related emissions would be negligible to minor, depending on the intensity of truck trips generated along the Merced River corridor from simultaneously occurring construction projects.

Although cumulative growth in the region will tend to adversely affect air quality, implementation of ongoing state and federal mobile-source control programs will ameliorate this effect to some degree. With respect to particulate matter, conditions in the Merced River corridor would be determined by both regional sources and local sources, and could be beneficial or adverse. Considered together with the adverse impacts associated with regional air quality influences, the cumulative projects would have a local, long-term, minor, beneficial effect on air quality in the Merced River corridor.

Alternative 1 and the cumulative projects would have a local, long-term, minor, beneficial impact on air quality. Alternative 1 would reduce the intensity of this beneficial impact to negligible in the short term, due to emissions that would be generated during maintenance activities and debris removal after dam failure.

Impairment

Impairment is not addressed in the air quality analysis because this resource topic is peripheral to the protection of the park for future generations.

Noise

Analysis

Under Alternative 1, ambient noise levels would be affected by noise associated with maintenance-related activities prior to dam failure and debris removal activities after eventual dam failure.

Although no action would be taken under Alternative 1, the National Park Service would continue to make minor repairs to attendant structures such as the screenhouse, concrete platform, and safety railing on the dam intake structure. Maintenance-related activities conducted prior to eventual dam failure would result in temporary increases in traffic and associated roadside noise levels. It is likely that maintenance activities would be conducted using similar noise best management practices as those described in Chapter II, Alternatives. Noise generated by ongoing maintenance activities could adversely affect the noise environment, but impacts would be both temporary and negligible relative to noise generated by other vehicle traffic.

Because no management action would be taken to repair or remove the dam under Alternative 1, eventual uncontrolled failure of the overflow portion of the dam structure would be expected. Dam failure could be sudden or could occur over a course of years or decades. An uncontrolled failure of the overflow portion of the structure or continued deterioration of the dam over time would result in a release of concrete and timber debris and grouted rockfill, which would litter the downstream channel of the Merced River. Upon eventual dam collapse, the National Park Service would use heavy-duty equipment to remove large debris from the river and banks, which would increase noise levels between the dam and the Cascades Picnic Area (and potentially to El Portal). Effects on the noise environment would be primarily related to dam debris removal activities (such as crane operation) and debris haul trips along local roadways. Operation of heavy-duty equipment during retrieval activities could generate substantial amounts of noise and would occur within close proximity to river recreation uses (e.g., the Cascades Picnic Area). Table IV-1 provides typical noise levels generated by heavy-duty equipment. Noise effects between the dam and the Cascades Picnic Area would vary depending upon a number of factors, such as the number and types of equipment in operation on a given day, usage rates, the level of background noise in the area, and the distance between sensitive uses and the heavy-duty equipment.

The specific mix of equipment to be used in debris removal is unknown, but could include the use of cranes, excavators, backhoes, skid steer loaders, and trucks. Noise levels would decrease by about 6 dBA with each doubling of distance from the noise source (e.g., noise levels from crane use would be in the range of 83 to 88 dBA at 100 feet from the site, and about 77 to 82 dBA at 200 feet from the site). Noise associated with debris removal would constitute a local, short-term, moderate, adverse impact.

Table IV-1
Typical Noise Levels from Heavy-Duty Equipment

Equipment	Typical Noise Level (dBA) 50 feet from the Source
Air Compressor	81
Backhoe	80
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	85
Paver	89
Pneumatic Tool	85
Pump	76
Rock Drill	98
Roller	74
Saw	76
Scraper	89
Truck	88
Rock Blasting	111 to 115 *

dBA = A-weighted decibels

* Adjusted to a distance of 50 feet; original data of 107 to 111 dBA corresponds to a distance of 75 feet. Measurement of rock blasting reflects use of nonglycerin dynamite.

SOURCES: Federal Transit Authority 1995, except for rock blasting; rock blasting data provided by the National Park Service (NPS 2000b)

Therefore, noise generated by routine maintenance activities and debris removal after dam failure under Alternative 1 would result in a local, short-term, negligible to moderate, adverse impact on the noise environment.

Over the long term, the acoustical environment in the vicinity of Cascades Diversion Dam would be shaped largely by natural sources of sound (i.e., rushing water and wind) punctuated by human-caused sources of noise, such as motor vehicles and aircraft.

Summary of Alternative 1 Impacts. Noise generated by routine maintenance and debris removal activities under Alternative 1 would result in a local, short-term, negligible to moderate, adverse impact to the ambient noise environment. There would be no long-term impact on the noise environment under Alternative 1.

Cumulative Impacts

Cumulative effects to the ambient noise environment discussed herein are based on the analysis of past, present, and reasonably foreseeable future actions in the Merced River corridor in combination with potential effects of this alternative. The projects identified below are examples of projects that could affect noise within the river corridor.

The *Yosemite Valley Plan* proposes to enhance the quality of the visitor experience in Yosemite Valley by reducing automobile congestion, limiting crowding, and expanding orientation and interpretation services. It also proposes traffic management systems and options for the sizing and placement of parking lots, both within and outside of Yosemite Valley. Parking lots outside the Valley could be used to intercept day visitors and shift those visitors to Valley-bound shuttle buses. Implementation of the Yosemite Area Regional Transportation System and Yosemite Valley Shuttle Bus Improvements also has the effect of reducing regional vehicle trips. Overall, sound levels associated with traffic along most regional roadways would be reduced, representing a local, long-term, moderate, beneficial impact on the noise environment.

Short-term adverse impacts on ambient noise levels could result from construction activities associated with some of the reasonably foreseeable projects planned or approved within the Merced River corridor, such as the Curry Village Employee Housing, Lower Yosemite Fall, and Yosemite Lodge Area Redevelopment projects. The adverse effects from construction of these projects would be localized and short term in nature, and primarily related to construction-generated traffic on roadways serving the project sites. Noise generated by the construction of cumulative projects would result in a local, short-term, negligible to minor, adverse impact to the ambient noise environments.

Over the long term, the gradual increase in annual visitation to the park could potentially offset the beneficial effects of the cumulative projects discussed above, resulting in a net local, long-term, minor, adverse effect on the noise environment. Alternative 1 would contribute to this cumulative impact in the short term.

Impairment

Impairment is not addressed in the noise analysis because this resource topic is peripheral to the protection of the park for future generations.

Cultural Resources

Archeological Resources

Analysis

There are no known archeological resources located within the immediate vicinity of the dam (NPS 1987b). Under Alternative 1, there would be no change in management and treatment of archeological resources. The dam would continue to degrade and eventually fail, and dam materials and impounded sediments would be released downstream. Debris could dam the river, divert the river from its channel, or substantially erode the otherwise stable riverbanks in the area between the dam and Cascades Picnic Area (or potentially as far as El Portal). These activities could unearth as-yet unknown sensitive prehistoric or historic archeological resources in the vicinity of the dam downstream to Cascades Picnic Area. Although the banks of the Merced River would stabilize over time, this effect would not likely be realized for some time. In the interim, erosion and erosion-related effects (e.g., bank instability and erosion that could potentially affect archeological resources) would continue. Activities associated with removal of dam debris are not anticipated to involve earthmoving and grading that could affect archeological resources. Any actions undertaken by the National Park Service would be performed in accordance with stipulations in the park's 1999 Programmatic Agreement. The evidence of thousands of years of human occupation, reflected in the four archeological sites downstream of the dam, would be

unaffected. Overall, Alternative 1 would result in a local, long-term, minor to moderate, adverse impact to archeological resources.

Summary of Alternative 1 Impacts. There would be no change in the treatment and management of archeological resources as a result of Alternative 1. Dam failure and subsequent bank erosion could have a long-term adverse effect on archeological resources in the vicinity of the dam downstream to Cascades Picnic Area. Any site-specific planning and compliance actions would be performed in accordance with stipulations in the park's 1999 Programmatic Agreement. Overall, Alternative 1 would result in a local, long-term, minor to moderate, adverse impact to archeological resources.

Cumulative Impacts

Cumulative impacts to archeological resources discussed herein are based on analysis of past, present, and reasonably foreseeable future actions within the main stem of the Merced River region in combination with potential effects of this alternative.

In general, any archeological resources within the main stem of the Merced River area are the result of thousands of years of human occupation. Development of facilities within the river corridor has disturbed or destroyed numerous archeological resources and compromised the integrity of numerous other such resources, which has had an adverse cumulative effect on archeological resources.

Reasonably foreseeable future actions proposed in the region that could have an adverse cumulative effect on archeological resources in the main stem of the Merced River include development-related projects, such as implementing the *Yosemite Valley Plan*, the Replacement/Rehabilitation of Yosemite Valley Main Sewer Line, and at Eagle Creek Merced River Ecological Restoration. The extensive grading and ground disturbance likely required for these cumulative projects could disturb individual archeological resources. Each of these projects is near the main stem of the Merced River, which is an archeologically sensitive area. The *Yosemite Valley Plan* would have a local, long-term, adverse cumulative effect on cultural resources in Yosemite Valley, due to possible disturbance associated with earthmoving, construction, and demolition projects. The National Park Service would follow guidelines of the 1999 Programmatic Agreement and would avoid adverse effects to archeological resources to the greatest extent feasible.

The Merced River Plan provides a framework for decision-making on future management actions within the Merced River corridor through the application of a consistent set of decision-making criteria and considerations composed of seven management elements: boundaries, classifications, Outstandingly Remarkable Values, the Section 7 determination process, management zoning, the River Protection Overlay, and the Visitor Experience Resource Protection framework. The Merced River Plan would have a local, long-term, adverse cumulative effect on archeological resources.

The cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, negligible to minor, adverse impact on archeological resources, due to the potential disturbance of such resources.

Alternative 1 and the cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, negligible to minor, adverse impact on archeological resources.

Impairment

Although archeological sites along the river are key cultural resources within the Merced River corridor, the effect of this alternative on archeological resources would be primarily localized, and would not be considered severe. In addition, Alternative 1 would not change the treatment and management of archeological resources. Archeological sites throughout the remainder of the Merced River, downstream from Cascades Picnic Area, would be unaffected. Therefore, Alternative 1 would not impair archeological resources.

Ethnographic Resources

Analysis

There are potential ethnographic resources within the Merced River gorge, consisting of plant material traditionally gathered for basketry, food, ceremonies, insect repellent, etc. Under Alternative 1, there would be no change in management and treatment of ethnographic resources. The dam would continue to degrade and eventually fail, and dam materials and impounded sediments would be released downstream. Debris could dam the river, divert the river from its channel, or substantially erode the otherwise stable riverbanks in the area between the dam and Cascades Picnic Area (or potentially as far as El Portal). These activities could disturb ethnographic plant materials in the vicinity of the dam downstream to Cascades Picnic Area. Although the banks of the Merced River would stabilize over time, this effect would not likely be realized for some time. In the interim, erosion and erosion-related effects that could potentially affect ethnographic resources would continue.

Retrieval of dam debris would require multiple ingress and egress points for equipment and personnel, and the use of equipment along the river between Cascades Diversion Dam and Cascades Picnic Area, which could result in further disturbance of potential ethnographic resources. Any debris retrieval actions undertaken by the National Park Service would be performed in accordance with stipulations in the park's 1999 Programmatic Agreement, and the park would continue to consult with culturally associated American Indian tribes under this Programmatic Agreement and the cooperative agreement for traditional uses. Overall, Alternative 1 would result in a local, long-term, minor to moderate, adverse impact to ethnographic resources.

Summary of Alternative 1 Impacts. There would be no change in the treatment and management of ethnographic resources as a result of Alternative 1. Dam failure and subsequent bank erosion could have a long-term adverse effect on ethnographic resources in the vicinity of the dam downstream to Cascades Picnic Area. Any actions taken by the National Park Service would be performed in accordance with stipulations in the park's 1999 Programmatic Agreement, and the park would continue to consult with culturally associated American Indian tribes under this Programmatic Agreement and the cooperative agreement for traditional uses. Overall, Alternative 1 would result in a local, long-term, minor to moderate, adverse impact to ethnographic resources.

Cumulative Impacts

Cumulative impacts to ethnographic resources discussed herein are based on analysis of past, present, and reasonably foreseeable future actions within the main stem of the Merced River region in combination with potential effects of this alternative.

Ethnographic resources and their traditional cultural associations have been lost or damaged in the Merced River region through past development, visitor use, natural events, and widespread disruption of cultural traditions. Nevertheless, Yosemite National Park retains many sites and resources of significance to local and culturally associated American Indians.

In general, the ethnographic resources within the main stem of the Merced River are the result of thousands of years of human occupation. Development of facilities within Yosemite Valley has disturbed or destroyed numerous ethnographic resources and compromised the integrity of numerous other such resources, which has had an adverse cumulative effect on ethnographic resources.

Reasonably foreseeable future actions proposed in the region that could have an adverse cumulative effect on ethnographic resources in the region include development-related projects, such as implementing the *Yosemite Valley Plan*. Under the *Yosemite Valley Plan*, traditional gathering areas would be disturbed due to the expansion of modern development into historic village areas. Overall, implementation of the *Yosemite Valley Plan* would have a local, long-term, adverse effect on ethnographic resources.

The Merced River Plan provides a framework for decision-making on future management actions within the Merced River corridor through application of a consistent set of decision-making criteria and seven management elements. Potential future actions that could occur within management zones of the Merced River Plan could have beneficial or adverse effects on ethnographic resources.

An example of a reasonably foreseeable project that could beneficially affect ethnographic resources in Yosemite Valley is the Eagle Creek Merced River Ecological Restoration project. This cumulative project could restore native plant habitat, which would be a long-term, beneficial impact on ethnographic resources. The intensity of this impact would depend on the extent to which gathering sites were restored and access to traditional uses was continued. The Indian Cultural Center, proposed as part of the Yosemite Lodge Area Redevelopment, could beneficially affect ethnographic resources by adding a traditional village to the Valley, including traditional facilities and plants.

The cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, minor, adverse impact on ethnographic resources due to the disturbance of such resources.

Alternative 1 and the cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, minor, adverse impact on ethnographic resources.

Impairment

Although ethnographic resources along the river are key cultural resources within the Merced River corridor, the effect of this alternative on ethnographic resources would be primarily localized and would not be considered severe. In addition, Alternative 1 would not change the treatment and management of ethnographic resources. Ethnographic resources throughout the remainder of the Merced River, downstream from Cascades Picnic Area, would be unaffected. Therefore, Alternative 1 would not impair ethnographic resources.

Cultural Landscape Resources, Including Historic Sites and Structures

Analysis

Cascades Diversion Dam is expected to eventually fail, resulting in the loss of this contributing feature to the Yosemite Hydroelectric Power Plant (also known as the Cascades Powerhouse). Uncontrolled dam failure could also damage downstream elements of the Yosemite Hydroelectric Power Plant, the Merced Canyon Travel Corridor, and the Coulterville Stage Road, resulting in an adverse impact to the cultural landscape. As described in Chapter VI, Consultation and Coordination, Cascades Diversion Dam has been the subject of previous evaluation and mitigation actions. In 1986, the National Park Service evaluated the impacts associated with the demolition, relocation, and/or rehabilitation of all components of the Yosemite Hydroelectric Power Plant. This evaluation included the removal of the dam. With the completion of this evaluation, the National Park Service completed the consultation process associated with Section 106 of the National Historic Preservation Act of 1966, as amended. As part of this process, the National Park Service signed a Memorandum of Agreement with the California State Historic Preservation Officer and the Advisory Council on Historic Preservation, which included stipulations for dam removal.⁵ The National Park Service has complied with all stipulations of the Memorandum of Agreement and has sent a letter to the State Historic Preservation Officer indicating that the Section 106 consultation process is complete. In addition, any actions undertaken by the National Park Service (i.e., debris removal) would be performed in accordance with stipulations in the park's 1999 Programmatic Agreement. Therefore, the adverse impact would be reduced to moderate. Nationally significant historic resources throughout the remainder of the Merced River corridor, such as designed landscapes and developed areas, historic buildings, and circulation systems (trails, roads, and bridges), would be unaffected.

Summary of Alternative 1 Impacts. Uncontrolled dam failure would result in the loss of the dam, a cultural resource, and could cause damage to downstream elements of the Yosemite Hydroelectric Power Plant, the Merced Canyon Travel Corridor, and the Coulterville Stage Road, resulting in an adverse impact to the cultural landscape. Because demolition, relocation, and/or rehabilitation of all components of the Yosemite Hydroelectric Power Plant have been evaluated and the National Park Service has complied with all stipulation of the 1986 Memorandum of Agreement, and because any actions undertaken by the National Park Service (i.e., debris removal) would be performed in accordance with stipulations in the park's 1999 Programmatic Agreement, the adverse impact would be reduced to moderate.

⁵ Stipulations included the preparation of Historic American Engineering Report documentation, and the submittal of archival photographs and narrative to the State Historic Preservation Officer and the Fresno Metropolitan Museum. The pelton wheel turbines and sections of penstock and electrical equipment were removed and placed into the Fresno Metropolitan Museum for exhibit, along with an accurate scale model of the entire Merced River hydroelectric system.

Cumulative Impacts

Cumulative impacts to cultural landscape resources discussed herein are based on analysis of past, present, and reasonably foreseeable future actions within the main stem of the Merced River region in combination with potential effects of this alternative.

Cultural landscape resources have been lost or damaged in the Merced River corridor through past development, visitor use, and natural events, resulting in adverse cumulative impacts to the cultural landscape. Disappearing structures and sites include homestead cabins, barns, road and trail segments, bridges, mining complexes, railroad and logging facilities, historic tourist facilities, blazes, and campsites. These resources are the remainders of the region's lumbering and mining history and early tourism.

Reasonably foreseeable future actions proposed in the region that could affect cultural landscape resources include campground rehabilitation projects, such as those identified in the *Yosemite Valley Plan*. The *Yosemite Valley Plan* would remove, relocate, or modify historic buildings and structures, and introduce modern facilities and development within historic districts and contributing portions of the cultural landscape. The *Yosemite Valley Plan* calls for removal of the five Cascades residences and garages north of El Portal Road. Removal of these structures could require additional National Environmental Policy Act compliance. The Yosemite Hydroelectric Power Plant historic property would be re-evaluated following removal of the Cascades residences and garages, consistent with the requirements of the 1986 Memorandum of Agreement. The *Yosemite Valley Plan* would also restore native vegetation communities to patterns that are more in keeping with the cultural landscape and historic setting of the Valley. Overall, implementation of the *Yosemite Valley Plan* would adversely affect the cultural landscape.

Protection of river-related cultural resources that were not intended to impede the free-flow of the Merced River is an integral component of the Merced River Plan. The Merced River Plan provides a framework for decision-making on future management actions within the Merced River corridor through application of a consistent set of decision-making criteria and considerations composed of seven management elements: boundaries, classifications, Outstandingly Remarkable Values, the Section 7 determination process, management zoning, the River Protection Overlay, and the Visitor Experience and Resource Protection framework. The Merced River Plan would have a beneficial cumulative effect on cultural resources, including cultural landscapes, historic sites, and historic structures.

The cumulative projects would result in a local, long-term, minor, adverse impact on the cultural landscape due to the disturbance of cultural landscape resources. Alternative 1 and the cumulative projects would result in a local, long-term, minor, adverse impact on such resources.

Impairment

Although the dam is a contributing element of the Yosemite Hydroelectric Power Plant, the effect of this alternative on cultural landscape resources would be primarily localized and would not be considered severe. In addition, Alternative 1 would not change the treatment of cultural landscape resources. Cultural landscape resources throughout the remainder of the Merced River, downstream from Cascades Picnic Area, would be unaffected. Therefore, Alternative 1 would not impair cultural landscape resources.

Social Resources

Transportation

Analysis

Under Alternative 1, the dam would be retained and would not affect transportation patterns. The 12-space parking lot northeast of the El Portal Road/Big Oak Flat Road intersection is used as a place for groups to meet and carpool to other areas of the park, for access to nearby rockclimbing locations, and for access to the intake structure, which is used as an informal viewing platform. Carpools reduce traffic volumes and thereby improve traffic flow; however, because of the number of parking spaces available and the low number of parked cars observed at the parking lot, carpool formation at this lot is very low. In addition, the parking area would continue to provide a location for park operations staging, emergency use by disabled vehicles, and for orientation to park destinations (i.e., consulting maps). Under Alternative 1, the continued use of the parking area would constitute a local, long-term, minor, beneficial impact to traffic flow.

Use of the intake structure as a public viewpoint was not the intention of the park, and there is no pedestrian crosswalk from the parking lot north of El Portal Road to the intake structure. Under Alternative 1, vehicles traveling through the El Portal Road/Big Oak Flat Road intersection would continue to present a hazard to pedestrians crossing at this location. The parking lot is rarely full, if ever, and experiences low turnover compared to other viewing points. Under Alternative 1, continued use of the parking area for access to the intake structure would constitute a local, long-term, minor, adverse impact to traffic safety.

Although no action would be taken under Alternative 1, the National Park Service would continue to make minor repairs to attendant structures such as the screenhouse, concrete platform, and safety railing on the concrete platform of the intake structure. Maintenance-related activities before eventual failure of the dam would result in temporary increases in traffic. Due to the intermittent and short-term duration of these activities, associated effects would be negligible. Thus, maintenance-related activities prior to dam failure would result in a local, short-term, negligible, adverse impact to traffic flow.

Because no management action would be taken to repair or remove the dam under Alternative 1, eventual uncontrolled failure of the overflow portion of the dam structure would be expected. Dam failure could be sudden or could occur over a course of years or decades. The timing and manner of dam failure cannot be accurately predicted but could be catastrophic, requiring an immediate emergency response and generating traffic associated with law enforcement, fire, and emergency medical units, and the evacuation of visitors. Such activities could require traffic control and rerouting. An uncontrolled failure of the overflow portion of the structure or continued deterioration of the dam over time would result in a release of concrete and timber debris and grouted rockfill, which would litter the downstream channel of the Merced River. Upon eventual dam failure, the National Park Service would remove large debris from the river and banks, which could result in adverse effects on traffic flow. Traffic volumes on El Portal Road would increase during transport of debris removal equipment, worker commute trips, and truck trips to haul debris materials from the Merced River and its banks to appropriate recycling facilities or reuse sites. Because the increase in traffic volumes would not exceed the capacity of El Portal Road or other roads in the park, the effect of increased truck trips on traffic flow would be short term and negligible. Some debris removal activities, however, may require small,

temporary staging areas for heavy-duty equipment (e.g., cranes) on portions of El Portal Road downstream from the Cascades Diversion Dam site to the Cascades Picnic Area (and potentially to El Portal). Setting up such staging areas could entail closing one lane of El Portal Road and/or turnouts and using flaggers to guide traffic in both directions, thus resulting in trip delays. The need for such equipment staging areas would result in a local, short-term, minor to moderate, adverse impact to traffic flow. Due to the uncertainty regarding timing (i.e., the time of year) and the locations of debris removal, Alternative 1 would result in a local, short-term, minor to moderate, adverse impact to transportation related to dam debris removal activities.

Summary of Alternative 1 Impacts. Under Alternative 1, the continued use of the parking area would constitute a local, long-term, minor, beneficial effect on traffic flow. Under Alternative 1, continued use of the parking area by visitors for access to the intake structure would constitute a local, long-term, minor, adverse impact to traffic safety. Maintenance-related activities prior to dam failure under Alternative 1 would result in a local, short-term, negligible, adverse impact to traffic flow. Emergency response and debris removal activities under Alternative 1 would result in a local, short-term, minor to moderate, adverse impact to traffic flow.

Cumulative Impacts

Cumulative effects to transportation discussed herein are based on analysis of past, present, and reasonably foreseeable future actions in the Merced River corridor in combination with potential effects of this alternative. The projects identified below include only those projects that could affect traffic flow, access and circulation, and/or transportation safety conditions in the vicinity of the river corridor.

Past, present, and reasonably foreseeable projects that could have a long-term beneficial effect on transportation include the *Yosemite Valley Plan* and the Yosemite Area Regional Transportation System. Since 1950, the population of California has tripled, and the rate of increase in vehicle-miles-traveled has increased six-fold. Transportation conditions within the park have been influenced by this surge in population growth. In the 1980s, a Restricted Access Plan was developed for use when traffic and parking conditions in Yosemite Valley are overcongested. The plan has the effect of reducing the number of incoming vehicles until the traffic volume and parking demand in Yosemite Valley decrease sufficiently (as visitors leave the Valley) to stabilize traffic conditions, resulting in a long-term, major, beneficial impact to traffic flow on El Portal Road and Big Oak Flat Road. The *Yosemite Valley Plan* proposes to enhance the quality of the visitor experience in Yosemite Valley by reducing automobile congestion and limiting crowding. It also proposes traffic management systems and options for the sizing and placement of parking lots, both within and outside of Yosemite Valley. Parking lot(s) outside the Valley could be used to intercept day visitors and shift those visitors to Valley-bound shuttle buses. The *Yosemite Valley Plan* would result in a substantial decrease in traffic volumes and a major improvement in traffic flow within Yosemite Valley and particularly on El Portal Road between its intersection with Big Oak Flat Road and Pohono Bridge. Therefore, the *Yosemite Valley Plan* would result in a local, long-term, major, beneficial impact to traffic flow, access and circulation, and transportation safety conditions along the Merced River corridor and in Yosemite Valley.

Construction of some of the reasonably foreseeable projects planned or approved within the Merced River corridor, such as the Curry Village Employee Housing, Lower Yosemite Fall, and Yosemite Lodge Area Redevelopment projects, could result in short-term adverse impacts on transportation. The adverse effects of these projects would be localized and short term in nature,

and primarily related to construction-generated traffic on roadways serving the project sites. Construction activities would increase traffic on local roadways, both from equipment and material haul trips and commute trips by construction workers. Some construction projects, such as the El Portal Road Improvement Project (the segment from Cascades Diversion Dam to Pohono Bridge) could also result in trip delays. The intensity of the adverse effects from the construction-related traffic would range from minor to moderate, depending on which, if any, of the construction projects occurred simultaneously. Activities related to the construction of the reasonably foreseeable projects would result in a local, short-term, minor to moderate, adverse impact to traffic flow.

Collectively, the cumulative projects discussed above would have a local, long-term, major, beneficial impact on transportation conditions along the Merced River corridor. Construction activities associated with the development of cumulative projects, however, would reduce the intensity of this beneficial impact to a minor or moderate level in the short term. Alternative 1 and the cumulative projects would result in a local, long-term, moderate, beneficial impact on transportation conditions along the Merced River corridor.

Impairment

Impairment is not addressed in the transportation analysis because this resource topic is peripheral to the protection of the park for future generations.

Scenic Resources

Analysis

Under Alternative 1, the diversion dam, abutments, screenhouse, and intake structure would remain in their present condition, without maintenance or repair (other than ongoing safety repair). Use of the intake structure as an informal viewing platform would continue. The dam and attendant structures would continue to visually intrude on the scenic character of this area of the river corridor and on views from the Merced River, its banks, and El Portal Road. Although this intrusion diminishes the wild and free-flowing character of the river that exists in segments upstream and downstream of the dam, these structures do not dominate the natural landscape from any viewpoint, as noted in the Setting section. Under Alternative 1, continued deterioration would cause the release of dam debris into the river or result in complete dam failure. Dam-related debris would litter the gorge downstream to the Cascades Picnic Area, diminishing the scenic quality of areas where it was deposited.

Following dam failure, sections of the structure would likely gouge the banks and scour the river bottom downstream to the Cascades Picnic Area, leaving substantial and highly visible evidence of damage to the banks and to stands of vegetation. Under Alternative 1, it is assumed that debris deposited in the channel by the dam's continued deterioration or failure would be removed by the National Park Service as soon as feasible. However, depending on the time of year and river conditions, completion of debris cleanup could be delayed for a period of months. Debris removal activities and equipment transport could extend downstream to Cascades Picnic Area (or as far as El Portal) and would temporarily increase the visual intrusion effects. Once debris was removed from the river, damage to the riverbanks and vegetation could continue to be visible for a period of years. The continued deterioration of the dam, deposition of debris in the river from deterioration and subsequent failure, and operation of equipment to remove and transport dam

debris would result in a local, short-term, minor, adverse effect on scenic resources in the Merced River corridor from the dam to the Cascades Picnic Area.

In the long term, failure of the dam would remove a structure that is a source of visual intrusion upon the scenic character of the Merced River corridor. Following dam failure and the loss of the intake structure as an informal river viewing platform, views of the river and dramatic rock formations in the area could still be observed from the vehicle turnout west of the dam along El Portal Road. Complete failure of the dam would result in a local, long-term, minor, beneficial effect on scenic resources along the Merced River corridor.

Summary of Alternative 1 Impacts. Alternative 1 would result in a local, short-term, minor, adverse impact to scenic resources within the Merced River corridor downstream to the Cascades Picnic Area. Prior to dam failure, the dam in its deteriorating condition would continue to visually intrude on the scenic character of this area of the river corridor and on views from the Merced River, its banks, and El Portal Road. Dam failure under Alternative 1 would ultimately eliminate a landscape feature that currently contrasts with and detracts somewhat from the scenic resource values of the Merced River. Thus, Alternative 1 would result in a local, long-term, minor, beneficial impact to scenic resources in this portion of the Merced River corridor.

Cumulative Impacts

Cumulative impacts to scenic resources are based on analysis of past, present, and reasonably foreseeable future actions in the Merced River corridor region in combination with potential effects of this alternative. The projects identified below include only those projects that could affect scenic resources within the river corridor or in the immediate project vicinity, including projects that could affect scenic resources along El Portal Road within and near the park.

Scenic resources have been affected by numerous past actions. Primary among these is the alteration of natural communities by Euro-American settlers. For example, agricultural activities and the development of tourism resulted in the drying out of the Valley by breaching the moraine and controlling naturally occurring fires, which affected vegetation patterns along the Merced River. Broadleaf trees along the riverbanks were replaced by the comparatively dense stands of conifers that exist today. These events have resulted in a local, long-term, adverse effect on scenic resources, as the conifers now block views of important scenic resources that were visible before the vegetation patterns were changed.

Actions that could have a net beneficial cumulative effect on scenic resources include those that improve the general health of ecosystems that can be seen from or within the Merced River corridor (e.g., Eagle Creek Merced River Ecological Restoration, and implementation of the *Yosemite Valley Plan*), and those projects that could reduce the number of vehicles entering the park and therefore the frequency of intrusion of vehicles into the scenic landscape (e.g., the Yosemite Area Regional Transportation System). The Merced River Plan prescribes the restoration of degraded areas of the Merced River corridor, resulting in beneficial impacts on scenic resources. In addition, implementation of the *Yosemite Valley Plan* would restore 140 acres of degraded areas and result in a net decrease in development within Yosemite Valley.

Reasonably foreseeable projects that could have an adverse effect on scenic resources include development-related projects (e.g., construction of lodging at Yosemite Lodge and Curry Village, and the Yosemite Motel Expansion Project). The local, long-term, adverse effects of these

projects would occur if new structures and/or infrastructure intruded into views of important scenic resources within or visible from the Merced River corridor or en route to the Merced River corridor via El Portal Road. For example, the Yosemite Motels Expansion project could increase the development density in the vicinity of the Merced River in El Portal and reduce the vegetative screening of the existing motel complex.

The cumulative projects within and in the vicinity of the Merced River corridor would result in a local, long-term, major, beneficial cumulative impact on scenic resources along the Merced River corridor because of the overall emphasis of these projects on restoring disturbed or developed land to natural conditions and improving the health of ecosystems.

Alternative 1 and the cumulative projects within the Merced River corridor would result in a local, long-term, major, beneficial impact on scenic resources in the Merced River corridor, due to the overall emphasis on restoring disturbed or developed land to natural conditions, improving the health of ecosystems, and eliminating Cascades Diversion Dam. These beneficial effects would outweigh the short-term adverse effect associated with Alternative 1 and the cumulative development projects.

Impairment

Alternative 1 would result in a short-term adverse impact, but a long-term beneficial impact to scenic resources within the Merced River corridor downstream to the Cascades Picnic Area. Although the Merced River is central to the corridor's scenery, the short-term adverse effect of this alternative on scenic resources in the Merced River corridor would be primarily localized and of temporary duration and would not be considered severe. Scenic resources throughout the Merced River gorge downstream of the Cascades Picnic Area would remain unaffected. Therefore, Alternative 2 would not impair scenic resources.

Recreation

Analysis

In the near term, the dam would be retained and would not affect recreation patterns. Sightseers use the intake structure of Cascades Diversion Dam to view the river and rock formations of the Merced River gorge. It was not the intention of the park, however, to create a public viewpoint in this location, and there is no pedestrian crosswalk from the parking lot north of El Portal Road to the intake structure. Under Alternative 1, vehicles traveling through the El Portal Road/Big Oak Flat Road intersection would continue to present a hazard to pedestrians crossing at this location. While there are no formal hiking trails near the dam, visitors are known to walk on the dam's wooden crest and exposed riverbanks and rocks when water levels are low and could fall from the dam structure. The potential for injury and/or fatality due to pedestrian hazards on El Portal Road and to falls from the dam structure would constitute a local, short-term, moderate, adverse impact to active recreational activities in the immediate vicinity of the dam.

Continued deterioration and eventual failure of the dam would deposit debris and sediment within the gorge and near Cascades Picnic Area (and potentially downstream to El Portal). Failure of the dam under Alternative 1 would affect river-dependent recreational uses downstream from the dam, including swimming, wading, and fishing. The National Park Service would employ early warning evacuation procedures for downstream areas in the event of an uncontrolled dam failure. However, depending on how and when dam debris is released, people recreating in the river

could be exposed to debris washing downstream following failure, and localized flooding, potentially resulting in serious injuries or fatalities. The potential for injury and/or fatality in the event of dam failure would constitute a local, short-term, moderate, adverse impact to active recreational activities in the immediate vicinity of the dam as well as downstream to Cascades Picnic Area.

In addition, debris deposited in the river channel and increased sedimentation following dam failure, and subsequent bank erosion, could temporarily degrade water quality and alter water flows, adversely affecting river conditions that currently support active recreational pursuits (e.g., swimming and fishing) and passive recreational activities (e.g., sightseeing and photography) downstream to the Cascades Picnic Area, and potentially to El Portal. Thus, due to these effects on water quality and flows, dam failure would result in a local, short-term, moderate, adverse impact to active recreational activities downstream from the dam to the Cascades Picnic Area.

Following failure of the dam under Alternative 1, nearby parking areas and trails from the dam area to Cascades Picnic Area would likely be obstructed or closed temporarily, resulting in delays and restrictions on use. Cleanup tasks under Alternative 1 likely would extend from the dam area to the Cascades Picnic Area (and potentially to El Portal) due to the uncontrolled transport of dam debris in the river, and could halt or curtail recreational activities and access for an extended period of time in this reach. Accordingly, Alternative 1 would result in a local, short-term, minor, adverse effect on recreational access to areas between the dam and the Cascades Picnic Area.

Summary of Alternative 1 Impacts. The potential for injury and/or fatality due to pedestrian hazards on El Portal Road and to falls from the dam structure would constitute a local, short-term, moderate, adverse impact to active recreational activities in the immediate vicinity of the dam. The potential for injury and/or fatalities in the event of dam failure would constitute a local, short-term, moderate, adverse impact to active recreational activities in the immediate vicinity of the dam as well as downstream to Cascades Picnic Area. The effects of dam failure on water quality and flows would result in a local, short-term, moderate, adverse impact to active recreation downstream from the dam to the Cascades Picnic Area. Temporary obstruction and/or closure of existing roads, parking areas, and trails from the dam area to Cascades Picnic Area and associated delays during cleanup operations after dam failure would result in a local, short-term, minor, adverse effect on recreational access in this reach. Over the long term, no impacts on recreational resources would be expected.

Cumulative Impacts

Cumulative impacts on recreation are based on analysis of past, present, and reasonably foreseeable future actions in the Yosemite region in combination with potential effects of this alternative. The projects identified include only those that could affect recreation within the Merced River corridor or in the park vicinity.

Reasonably foreseeable projects that could have a beneficial cumulative effect on recreational opportunities include projects proposed under the *Yosemite Valley Plan*, such as development of a new visitor center in Yosemite Village and expanded transit service to more park destinations. Other projects that could have a beneficial cumulative effect on recreation include the following: Eagle Creek Merced River Ecological Restoration, Happy Isles to Vernal Falls Trail Reconstruction, Yosemite Valley Shuttle Bus Stop Improvements, and Yosemite Area Regional Transportation System. These projects could result in short-term disruptions of recreational

activities due to construction, but in the long term would provide expanded recreational opportunities in the park and improved transit service to more park destinations (although fewer private cars in the Valley would reduce spontaneity).

The Merced River Plan would have a beneficial cumulative effect on recreation in the Merced River corridor by protecting and enhancing a spectrum of recreational opportunities available in the corridor. In addition, the management zoning prescribed under the Merced River Plan would provide for various types of recreation, from opportunities for solitude to interactive and group-based recreational activities.

The cumulative projects would have a local, long-term, moderate, beneficial effect on recreation due to expanded recreational opportunities in the Merced River corridor and improved transit service to more park destinations.

Alternative 1 and the cumulative projects in the Merced River corridor would result in a local, long-term, moderate, beneficial impact on recreation due to expanded recreational opportunities in the Merced River corridor and improved transit service to more park destinations. The local, short-term, minor to moderate, adverse impact on river-related recreational activities resulting from dam failure would be offset by the beneficial impacts of the cumulative projects.

Impairment

Alternative 1 would result in local, short-term, minor to moderate, adverse impacts on river-related recreational activities due to ongoing safety hazards at the dam, and continued deterioration and eventual dam failure. Although the Merced River system and river-related recreation provide important opportunities for enjoyment of the park, the effect of this alternative on recreation would primarily be localized between the dam and the Cascades Picnic Area and would be limited in duration, and thus would not be considered severe. The diversity and quality of river-related recreational opportunities throughout the remainder of the Merced River corridor would not be affected. Therefore, Alternative 1 would not impair river-related recreational opportunities.

Interpretation and Orientation

Analysis

In the near term, the dam would be retained and would not affect interpretation and orientation. Dam failure would release dam debris and could result in downstream bank erosion, which could undermine El Portal Road, and could potentially damage downstream orientation signs (i.e., roadside signs) and interpretive opportunities at the Cascades Picnic Area. However, orientation and interpretation opportunities are limited in this reach. Thus, dam failure would result in a local, short-term, negligible to minor, adverse impact to orientation and interpretation opportunities downstream from the dam to the Cascades Picnic Area. Over the long term, Alternative 1 would have no effect on orientation and interpretation opportunities.

Summary of Alternative 1 Impacts. Dam failure under Alternative 1 could affect orientation and interpretation opportunities, resulting in a local, short-term, negligible to minor, adverse impact to orientation (i.e., roadside signs) and interpretation opportunities downstream from the dam to the Cascades Picnic Area.

Cumulative Impacts

Cumulative impacts on orientation and interpretation are based on analysis of past, present, and reasonably foreseeable future actions in the Yosemite region in combination with potential effects of this alternative. The projects identified include only those that could affect orientation and interpretation within the Merced River corridor or in the park vicinity.

Reasonably foreseeable projects that could have a beneficial cumulative effect on orientation and interpretation opportunities include projects proposed under the *Yosemite Valley Plan*, such as development of a new visitor center in Yosemite Village. Another project that could have a beneficial cumulative effect on orientation and interpretation is the Lower Yosemite Fall Project, which includes directional signage and educational exhibits. These projects could result in short-term disruptions of orientation and interpretation activities due to construction, but in the long term would provide expanded orientation and interpretation opportunities in the park.

The Merced River Plan would have a beneficial cumulative effect on orientation and interpretation in the Merced River corridor by protecting and enhancing a spectrum of recreational opportunities available in the corridor, some of which would include orientation and interpretation opportunities.

The cumulative projects would have a local, long-term, minor, beneficial effect due to expanded orientation and interpretation opportunities in the Merced River corridor.

Alternative 1 and the cumulative projects in the Merced River corridor would result in a local, long-term, minor, beneficial impact due to expanded orientation and interpretation opportunities in the Merced River corridor. The local, short-term, negligible to minor, adverse impact on orientation and interpretation opportunities resulting from dam failure would be offset by the beneficial impact of the cumulative projects.

Impairment

Dam failure under Alternative 1 would result in local, short-term, negligible to minor, adverse impacts on orientation and interpretation opportunities. Although orientation and interpretation opportunities within the Merced River system provide important opportunities for enjoyment of the park, the effect of this alternative on orientation and interpretation would primarily be localized between the dam and the Cascades Picnic Area and would be limited in duration, and thus would not be considered severe. The diversity and quality of orientation and interpretation opportunities throughout the remainder of the Merced River corridor would not be affected. Therefore, Alternative 1 would not impair orientation and interpretation opportunities.

Socioeconomics

Analysis

Because no active management action would be taken to repair or remove the dam under Alternative 1, eventual uncontrolled failure of the overflow portion of the dam structure would be expected. Debris removal would necessitate additional spending on labor and equipment and would therefore temporarily increase employment, income, and taxable retail sales. The amount of spending is unknown and would depend on the amount of labor and types of equipment needed; however, this spending would likely be greater than spending for planned, controlled dam removal. Due to the uncertainty regarding the magnitude and timing of project-related

equipment spending associated with potential dam failure, economic impacts cannot be definitively projected. Given currently available information, however, it is expected that Alternative 1 would have a regional, short-term, negligible, beneficial impact on the socioeconomy due to the temporary nature of the dam debris removal activity and the small magnitude of spending for debris removal compared with the size of the construction industry in the affected region. Uncontrolled dam failure would also likely result in damage to natural resources or to local utilities infrastructure downstream; however, these property damages are not readily quantifiable. The effects on natural resources and park operations are addressed under those resource topics.

Summary of Alternative 1 Impacts. Due to the uncertainty regarding the magnitude and timing of project-related equipment spending associated with potential dam failure, economic impacts cannot be definitively projected. Given currently available information, however, it is expected that Alternative 1 would have a regional, short-term, negligible, beneficial impact on the socioeconomy due to the temporary nature of the dam debris removal activity and the small magnitude of spending for debris removal compared with the size of the construction industry in the affected region.

Cumulative Impacts

Cumulative socioeconomic impacts discussed herein are based on analysis of reasonably foreseeable future actions in the Yosemite region in combination with potential effects of this alternative. The cumulative projects that follow are those relevant to the regional economy.

Reasonably foreseeable future projects by the National Park Service that could have a beneficial cumulative effect on the regional economy are related to construction activity, including the *Yosemite Valley Plan*; Cook's Meadow Ecological Restoration; Curry Village Employee Housing; Eagle Creek Merced River Ecological Restoration; Ecological Restoration of Flood-Damaged Campgrounds; the El Portal Road Improvement Project (from Cascades Diversion Dam to Pohono Bridge); Happy Isles Dam Removal; Happy Isles Fen Habitat Reclamation Project; Happy Isles Gauging Station Bridge Removal; Happy Isles to Vernal Falls Trail Reconstruction; Improvements to Curry Village and East Yosemite Valley Campgrounds; Lower Yosemite Fall Project; Replacement/Rehabilitation of Yosemite Valley Main Sewer Line; Utilities Master Plan; Yosemite Lodge Area Redevelopment; and Yosemite Valley Shuttle Bus Stop Improvements. Private development projects such as the Yosemite Motels Expansion just outside of the park entrance at El Portal and other facilities constructed under the *Mariposa County General Plan Update* would also result in short-term spending in the construction sector.

The cumulative planning, transportation, facility improvement, and development-related projects identified would generate construction-related output, employment, and income in the regional economy. Construction spending associated with the cumulative projects would also generate secondary output impacts as a result of local spending on materials and wages. Some of this construction-related spending would be expected to occur outside of the affected region.

The total construction-related spending in the affected region associated with the cumulative projects would have a short-term, major, beneficial impact on the regional economy resulting from the substantial and highly noticeable increase in construction output, income, and employment in the three-county region. The increase in construction-related output would be

highly noticeable when compared with the total output of the construction industry in the affected region.

Some projects would increase the amount of visitor overnight accommodations in or near the park, including the Improvements to Curry Village and East Yosemite Valley Campgrounds, Yosemite Lodge Area Redevelopment, and Yosemite Motels Expansion. Increased overnight accommodations from these projects would result in a beneficial impact to employment, output, and taxable retail sales over the long term. The effect of this increase would be negligible because the total increase in overnight accommodations would not be substantial in comparison to existing accommodations. Therefore, cumulative actions would result in a local, long-term, negligible, beneficial impact to the regional economy.

The cumulative projects within and in the vicinity of Yosemite National Park would result in a local, long-term, negligible, beneficial impact to the regional economy, and a local, short-term, major, beneficial impact during construction. Alternative 1 would contribute to this effect.

Impairment

Impairment is not addressed in the socioeconomics analysis because this resource topic is peripheral to the protection of the park for future generations.

Park Operations

Analysis

Under Alternative 1, Cascades Diversion Dam would remain in place without maintenance or repair; however, the National Park Service would continue to make minor repairs to attendant structures such as the screenhouse, concrete platform, and safety railing on the river-right dam intake structure. The dam would continue to deteriorate and eventually fail, likely during high-flow conditions. The failed dam could divert riverflows, resulting in substantial erosion on both riverbanks as well as other adverse impacts to the river between the dam and Cascades Picnic Area (and potentially to El Portal). The timing and manner of dam failure cannot be predicted but could be catastrophic, requiring immediate emergency response from law enforcement, fire, and emergency medical units and the evacuation of park visitors. Park operations staff would be required to remove the dam debris as soon as feasible, under emergency conditions, and repair facilities damaged by dam debris.

Excess erosion on the river-right bank would threaten a wastewater line (which extends between El Portal and Yosemite Valley) and electrical conductors (which extend from a substation at the Cascades Powerhouse to a substation in Yosemite Valley), both of which are located under El Portal Road. Damage to these utilities would interrupt wastewater and electrical service in Yosemite Valley and could result in sewage spills, causing a substantial adverse impact.

Dam failure could result in a short-term (immediate) and dramatic increase in demand for the full range of park operations and emergency response staff to remove dam debris and repair damaged facilities downstream from the dam to the Cascades Picnic Area (and potentially to El Portal), a local, short-term, moderate to major, adverse impact. In addition, uncontrolled failure of the dam could damage the wastewater line and electrical conductors for Yosemite Valley. This would have a local, long-term, moderate to major, adverse effect on park facilities, depending on the nature and extent of damages.

Under Alternative 1, the parking area north of the dam would continue to serve as a park operations staging area, and the public telephone at the parking area would continue to be available to visitors for access to the park's emergency response system. Under Alternative 1, continued use of the parking area and public telephone would constitute a local, long-term, minor, beneficial impact to park operations.

Summary of Alternative 1 Impacts. Dam failure could result in a short-term (immediate) and dramatic increase in demand for the full range of park operations and emergency response staff to respond to evacuation and medical emergencies, remove dam debris, and repair damaged facilities downstream from the dam to the Cascades Picnic Area, a local, short-term, moderate to major, adverse impact. In addition, uncontrolled failure of the dam could damage the wastewater line and electrical conductors for Yosemite Valley. This would have a local, long-term, moderate to major, adverse effect on park facilities, depending on the nature and extent of damages. Under Alternative 1, continued use of the parking area and public telephone would constitute a local, long-term, minor, beneficial impact to park operations.

Cumulative Impacts

Cumulative effects on park operations and facilities are based on analysis of past, present, and reasonably foreseeable future actions in the Merced River corridor in combination with potential effects of this alternative. The extent to which past, present, or reasonably foreseeable future projects could have a cumulative effect, when combined with this alternative, is determined largely by whether such projects would affect park facilities or the demand for park operations services. Projects that affect park facilities themselves or the demand for facilities management, resource management, and maintenance of utility systems services in particular would have the potential for cumulative effects.

Park operations and facilities have been affected by numerous National Park Service management decisions and projects since the inception of the park, including the implementation of Merced River Plan and *Yosemite Valley Plan*. Overall, there is no net adverse or beneficial effect of these past actions on park operations and facilities.

Actions that would have a beneficial cumulative effect on park operations and facilities are those that could reduce the number of visitors entering the park, reduce the number or amount of facilities within the park, or reduce long-term maintenance activities. An example is the Replacement/Rehabilitation of the Yosemite Valley Main Sewer Line. Although this project would have a short-term, adverse effect associated with planning, construction, replacement, and rehabilitation, its overall effect would be to reduce long-term maintenance. Therefore, this project would have a long-term, beneficial cumulative impact on park operations and facilities.

Examples of projects that would have an adverse effect on park operations and facilities are the Merced River Plan and the *Yosemite Valley Plan*. Implementation of these plans would substantially increase demand on park operations and facilities in the short term during planning, repair, rehabilitation, construction/demolition, development of the Visitor Experience and Resource Protection framework, and replacement of facilities (e.g., construction of new campsites and restoration of large areas of Yosemite Valley to natural conditions). Implementation of these plans is expected to have a local, short- and long-term, moderate to major, adverse impact on park operations and facilities.

Overall, the past, present, and reasonably foreseeable future actions would have a local, moderate, adverse cumulative impact because of the increased demand on park operations, services, and facilities, over both the short and long term. These cumulative effects, in combination with Alternative 1, would result in a local, short- and long-term, moderate to major, adverse impact on park operations and facilities, depending upon the nature and extent of damage to facilities.

Impairment

Park operations are not subject to the impairment standard. The National Park Service has a management responsibility to conserve the scenery and natural and historic objects and the wildlife therein; park operations are not included within this management responsibility.

Alternative 2 – Complete Dam Removal

Alternative 2 includes complete removal of the dam, the dam abutments, the intake structure, and the screenhouse, and restoration of the related river channel located beneath the dam site (see figure II-3). Approximately 4,400 to 5,400 cubic yards of sediments (including rocks and boulders) in the area upstream of the dam would be excavated and repositioned to stabilize the river-right bank and decrease the potential for sediment erosion. Figure II-4 indicates the river profile at Cascades Diversion Dam before and after removal of the dam structure and sediments. Natural river processes would continue to transport remaining sediments (up to a maximum range of 9,600 to 15,600 cubic yards of sediment) from the impoundment area over time, allowing for a gradual re-establishment of the natural river channel and related riparian habitat. It is expected that the river would fully recover incrementally over time as sediments are transported from the impoundment area. However, the rate of natural channel recovery and restoration would be monitored to determine if additional restoration actions were necessary. Following removal of the river-right abutment, intake structure, and screenhouse, the river-right bank would be stabilized using a bioengineered bank stabilization system to prevent erosion of the river-right bank. The objective of this alternative would be to restore the natural river character with a mixture and distribution of boulders, cobbles, gravels, sand, silt, soil, and vegetation similar to those found in adjacent riverbank segments.

Natural Resources

Geology, Geologic Hazards, and Soils

Analysis

Dam removal would have a short-term, adverse, removal-related impact to soils along the riverbank adjacent to the dam, at the parking lot north of El Portal Road, and at Pohono Quarry (e.g., compaction) similar to debris removal effects described under Alternative 1. However, dam removal would occur in a controlled manner (e.g., working within a delineated area and applying best management practices, such as providing erosion and sediment control measures [see Chapter II, Alternatives]). Alternative 2 would eliminate the more extensive adverse effects described under Alternative 1 (i.e., bank erosion, downstream hazards due to dam failure, and bank trampling during dam debris retrieval activities downstream to at least the Cascades Picnic Area). Thus, Alternative 2 would have a local, short- and long-term, minor, beneficial effect on soil resources. In addition, soil restoration and bank stabilization would reduce the potential for erosion and sedimentation, help stabilize channel shape and slopes, repair banks, and increase the protection of riverbanks, the adjacent existing roadway, and utility lines under El Portal Road, resulting in a local, long-term, moderate, beneficial impact on soils.

In the event of a rockfall under Alternative 2, boulders and talus could be deposited into the river reach in the former dam location, but would not damage structures. Rockfall material could redirect riverflows, but given that the channel would down-cut and water velocity would increase through a narrower, rock-lined channel with river-right bank stabilization, the potential for bank scour adjacent to the road would decrease, and Alternative 2 would have a local, long-term, minor, beneficial effect on public health and safety.

Under Alternative 2, the deposition of sediment following dam removal would benefit floodplain soils by providing a sediment source that would eventually settle out along the river and provide a

substrate for development of a soils horizon. However, the amount of sediment that would be released from behind the dam would be relatively insignificant compared to the overall area of expected deposition (the braided river reach at Cascades Picnic Area) and the amount of sediment that is typically transported downstream on a continual basis. The contribution of sediment available for soil development in the area of the dam and reservoir would be considered negligible.

Soil resources throughout the remainder of the Merced River corridor would be unaffected by this alternative.

Summary of Alternative 2 Impacts. Dam removal would result in a short-term impact to soils related to ground disturbance activities. However, dam removal activities would occur in a controlled manner, with the application of best management practices. Since Alternative 2 would avoid the more extensive adverse effects described under Alternative 1 (i.e., bank destabilization, erosion, and soil compaction and loss due to uncontrolled dam failure and debris retrieval activities), Alternative 2 would have a local, short-term, minor, beneficial effect on soil resources compared to Alternative 1. Site restoration and stabilization would reduce the potential for erosion and sedimentation, help stabilize channel shape and slopes, repair banks, and increase the protection of riverbanks, the adjacent roadway, and utility lines under El Portal Road, resulting in a local, long-term, moderate, beneficial impact on soils. Compared to Alternative 1, Alternative 2 would result in a local, long-term, minor, beneficial effect on public health and safety with respect to geologic hazards.

Cumulative Impacts

The cumulative impact analysis for geology under Alternative 2 is the same as described under the No Action Alternative. See the discussion of cumulative effects under Alternative 1.

Past, present, and reasonably foreseeable future actions would result in a long-term, minor, beneficial cumulative impact to soil resources and to public health and safety with respect to geologic hazards. Alternative 2 and the cumulative projects would result in a local, long-term, minor, beneficial impact to soil resources and public safety with respect to geologic hazards. Alternative 2 would avoid the more extensive adverse effects of soil erosion and bank destabilization compared to Alternative 1. Overall, the cumulative projects would restore soils in the project region, reduce soil degradation, and decrease the density of people and facilities in the talus slope zone.

Impairment

Alternative 2, with the application of best management practices, would result in beneficial effects on soil resources. Alternative 2 would not impair geologic resources.

Hydrology, Floodplains, and Water Quality

Analysis

Under Alternative 2, removal of Cascades Diversion Dam would improve riverflow dynamics and hydrologic processes by restoring the free-flowing condition of the Merced River, returning this portion of the river to a more natural state and enhancing its natural hydrologic regime.

Implementation of a bioengineered bank stabilization system on the river-right bank, using approximately 4,400 to 5,400 cubic yards of excavated sediments (including rocks/boulders), and

revegetation of the river-right bank would minimize lateral movement of the channel and decrease erosion, thereby protecting the bank from unnatural, accelerated erosion, although lateral movement of the channel to the north would be minimized by the presence of El Portal Road. The bank stabilization system to be implemented under Alternative 2 would result in a small net increase in floodplain at the site of the impoundment. Similar to Alternative 1, removing Cascades Diversion Dam would help restore the active flood regime and hydrologic processes. The removal of the dam would eliminate constriction of riverflow and improve the local, natural hydrologic regime. Compared to Alternative 1, Alternative 2 would have a local, long-term, moderate, beneficial impact on hydrologic processes by removing an unnatural constriction in the river, restoring the natural hydrologic regime of the river, avoiding bank erosion and localized flooding associated with continued deterioration and eventual dam failure, and stabilizing the riverbank once the river-right abutment and intake structure are removed.

Removal of Cascades Diversion Dam under Alternative 2 would cause minor amounts of fine-grained sediment originating from behind the dam to be released into the river. Sediment sources include riverbed materials dislodged during excavation of sediments, installation of the diversion channel, and diversion of flows between the river-right and river-left; concrete dust generated and friable concrete dislodged during dam removal activities; and timber fragments. Fine-grained materials (less than 0.07 millimeter in diameter) make up less than 1% of impounded materials and would not cause excessive turbidity downstream. The sediment dislodged during removal activities is expected to impact water quality only temporarily within a localized area, and the sediment would settle out downstream in areas of low energy, particularly considering that dam removal activities would take place during periods of low flow. Sediment excavation and dam removal would occur in a controlled manner (e.g., within a delineated work area, during low-flow conditions, and with the application of best management practices [see Chapter II, Alternatives]). Measures to control sediment sources using barriers would serve to capture the majority of sediment released during dam removal. Following dam removal, some portion of the remaining impounded sediments (approximately 9,600 to 15,000 cubic yards, including rocks/boulders) would wash downstream. As described under Alternative 1, some portion of impounded sediment and materials would likely remain following dam removal. Downstream sediment transport and evolution of natural channel dynamics under Alternative 2 is the same as described under Alternative 1; however, the total amount of sediment available for downstream transport would be reduced. Further, dam-related debris would not be washed downstream; and Alternative 2 would avoid the water quality and turbidity impacts associated with downstream erosion and with riverbed and bank disturbance during dam debris retrieval that would occur under Alternative 1. Therefore, Alternative 2 would have a local, short-term, moderate, beneficial effect on water quality compared to Alternative 1.

Water quality could be compromised if petroleum components were discharged from heavy equipment. The proposed best management practices implemented under this alternative, as described in Chapter II, Alternatives, would ensure that petroleum releases from heavy equipment were minimized within the dam removal area. Although there are potential sources of pollutants (i.e., petroleum products) associated with the dam removal phase of this project, removal of the dam would avoid the more extensive adverse effects of erosion. As a result, Alternative 2 would have a local, short-term, minor, beneficial effect on water quality compared to Alternative 1.

Summary of Alternative 2 Impacts. Dam removal would have a short-term water quality impact related to the discharge of petroleum components. However, dam removal activities would occur in a controlled manner, with the application of best management practices. Compared to Alternative 1, Alternative 2 would have local, short- and long-term, minor to moderate, beneficial impact on hydrologic processes and water quality by avoiding bank erosion and localized flooding associated with continued deterioration and eventual dam failure, reducing sedimentation, and controlling removal of the dam.

Cumulative Impacts

The cumulative impacts assessment for hydrologic resources under Alternative 2 is the same as under Alternative 1. The cumulative projects would result in an overall local, long-term, minor, beneficial impact to hydrologic processes and water quality. The past, present, and reasonably foreseeable future projects considered cumulatively with Alternative 2 would result in a local, long-term, minor, beneficial impact on hydrologic processes. The beneficial impacts associated with Alternative 2 would nominally contribute to overall beneficial cumulative impacts on hydrologic processes and water quality.

Impairment

Alternative 2, with the application of best management practices, would have a local, short- and long-term, minor to moderate, beneficial impact on hydrologic processes and water quality. Alternative 2 would not impair hydrologic resources.

Wetlands

Analysis

Dam removal would have short-term, adverse, removal-related effects on approximately four acres of wetland and aquatic habitat. Effects would be related to heavy equipment and dam removal activities and could include soil compaction, dust, vegetation removal, root damage, erosion, and introduction and spread of non-native species. The addition of silt, the resuspension of sediment, or the introduction of pollutants (i.e., fuels, lubricants) related to dam removal operations could temporarily degrade the quality of native wetland and aquatic habitats in the immediate vicinity of the dam. The application of mitigation measures described in Chapter II, Alternatives (e.g., best management practices) would reduce the potential adverse impacts to wetland and aquatic habitats to a negligible intensity. Because dam removal would occur in a controlled manner, with the application of mitigation measures, Alternative 2 would have local, short-term, negligible, beneficial effect on wetland and aquatic habitat compared to Alternative 1.

Removal of Cascades Diversion Dam would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing its biological integrity. The bioengineered bank stabilization would re-establish near-natural conditions similar to those upstream of the impoundment, where rocky riverbanks support riparian and upland vegetation. The revegetation would limit competition from weedy species, reduce potential for erosion and sedimentation, and help stabilize channel shape and slopes. Tree species would add structural diversity to the floodplain, and eventually become a source of large, woody debris. Alternative 2 would result in “no net loss” of wetland functions or values. The re-establishment of the riparian corridor along this portion of the river would have a local, long-term, minor to moderate, beneficial effect on wetland and aquatic resources in the vicinity of Cascades Diversion Dam compared to Alternative 1.

Summary of Alternative 2 Impacts. Dam removal activities would have a short-term impact to wetland and aquatic habitat resources associated with ground disturbance and the potential introduction of pollutants. However, dam removal activities would occur in a controlled manner, with the application of mitigation, reducing the adverse effect to a negligible intensity. Therefore, Alternative 2 would have a local, short-term, negligible, beneficial effect on wetland and aquatic habitat compared to Alternative 1. Removal of Cascades Diversion Dam would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing its biological integrity. Alternative 2 would result in a local, long-term, moderate, beneficial effect on wetland and aquatic resources compared to Alternative 1.

Cumulative Impacts

The cumulative impact analysis for wetland resources under Alternative 2 is the same as described under the No Action Alternative. See the discussion of cumulative effects under Alternative 1. Past, present, and reasonably foreseeable future projects in combination with Alternative 2 would have a net long-term, major, beneficial effect on wetland patterns within the Merced River corridor.

Impairment

Given the incorporation of mitigation into the design of this alternative, Alternative 2 would result in a local, short- and long-term, negligible to moderate, beneficial impact to wetland and aquatic resources. Alternative 2 would not impair wetland resources or values.

Vegetation

Analysis

Dam removal would have short-term, adverse, removal-related effects to riparian and aquatic habitat. Effects would be related to heavy equipment and dam removal activities and could include soil compaction, dust, vegetation removal, root damage, erosion, and introduction and spread of non-native species. The addition of silt, the resuspension of sediment, or the introduction of pollutants (i.e., fuels, lubricants) related to dam removal operations could degrade the quality of native vegetation. The application of mitigation measures described in Chapter II, Alternatives (e.g., best management practices) would reduce these potential short-term adverse dam removal impacts to vegetation to a negligible intensity. Because dam removal would occur in a controlled manner, with the application of mitigation measures, Alternative 2 would result in a local, short-term, negligible, beneficial impact to vegetation compared to Alternative 1.

Removal of Cascades Diversion Dam would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing its biological integrity. The bioengineered bank stabilization would re-establish conditions similar to those upstream of the impoundment, where rocky riverbanks support riparian and upland vegetation. The revegetation would limit competition from weedy species, reduce potential for erosion and sedimentation, and help stabilize channel shape and slopes. Tree species would add structural diversity to the floodplain, and eventually become a source of large, woody debris. The re-establishment of the riparian corridor along this portion of the river would have a local, long-term, minor to moderate, beneficial effect on streamside vegetation in the vicinity of Cascades Diversion Dam compared to Alternative 1.

Summary of Alternative 2 Impacts. Dam removal activities would have a short-term impact to vegetation associated with ground disturbance and the potential introduction of pollutants. However, dam removal activities would occur in a controlled manner, with the application of mitigation, reducing the adverse effect to a negligible intensity. Therefore, Alternative 2 would have a local, short-term, negligible, beneficial effect on vegetation compared to Alternative 1. Removal of Cascades Diversion Dam would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing its biological integrity. The re-establishment of the riparian corridor along this portion of the river would have a local, long-term, minor to moderate, beneficial effect on streamside vegetation in the vicinity of Cascades Diversion Dam compared to Alternative 1.

Cumulative Impacts

The cumulative impact analysis for vegetation under Alternative 2 is the same as described under the No Action Alternative. See the discussion of cumulative effects under Alternative 1. Past, present, and reasonably foreseeable future projects in combination with Alternative 2 would have a net long-term, major, beneficial effect on vegetation patterns within the Merced River corridor.

Impairment

Given the incorporation of mitigation into the design of this alternative, Alternative 2 would result in a local, short- and long-term, negligible to moderate, beneficial impact to vegetation. Alternative 2 would not impair vegetation resources or values.

Wildlife

Analysis

Localized, minor, short-term, temporary effects on native fish and wildlife could occur during dam removal. Effects would be related to heavy equipment and human intrusion and could include increased dust, vegetation removal, noise, or decreased oxygen levels. Dam removal would have short-term, adverse, removal-related effects on wildlife habitat. These actions could result in direct losses of nests or burrows, and indirect effects through the disturbance of nesting birds or roosting bats. The addition of silt, the resuspension of sediment, or the introduction of pollutants (i.e., fuels, lubricants) could degrade the quality of the aquatic environment and the wildlife habitat it provides. The application of mitigation measures described in Chapter II, Alternatives (e.g., best management practices) would reduce the potential adverse impacts to native fish and wildlife to a negligible intensity. Because dam removal would occur in a controlled manner, with the application of mitigation measures, Alternative 2 would result in a short-term, negligible, beneficial impact to wildlife compared to Alternative 1.

Removal of Cascades Diversion Dam would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing the biological integrity of this segment for native fish and wildlife. The bioengineered bank stabilization would re-establish conditions similar to those upstream of the impoundment, where rocky riverbanks support riparian and upland vegetation. The revegetation would limit competition from non-native species, reduce potential for erosion and sedimentation, and help stabilize channel shape and slopes. Tree species would add structural diversity to the floodplain, and eventually become a source of large, woody debris. The re-establishment of the riparian corridor along this portion of the river would have a local, long-term, minor to moderate, beneficial effect on fish and wildlife habitat in the vicinity of Cascades Diversion Dam compared to Alternative 1.

Summary of Alternative 2 Impacts. Dam removal activities would have a short-term impact to wildlife associated with ground disturbance and the potential introduction of pollutants. However, dam removal activities would occur in a controlled manner, with the application of mitigation, reducing the adverse effect to a negligible intensity. Therefore, Alternative 2 would have a local, short-term, negligible, beneficial effect on wildlife compared to Alternative 1. Removal of Cascades Diversion Dam would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing the biological integrity of this segment for native fish and wildlife. The re-establishment of the riparian corridor along this portion of the river would have a local, long-term, minor to moderate, beneficial effect on fish and wildlife habitat in the vicinity of Cascades Diversion Dam compared to Alternative 1.

Cumulative Impacts

The cumulative impact analysis for fish and wildlife under Alternative 2 is the same as described under the No Action Alternative. See the discussion of cumulative effects under Alternative 1. Past, present, and reasonably foreseeable future projects in combination with Alternative 2 would have a net long-term, minor to moderate, beneficial effect on fish and wildlife patterns within the Merced River corridor.

Impairment

Given the incorporation of mitigation into the design of this alternative, Alternative 2 would result in a local, short- and long-term, negligible to moderate, beneficial impact to native fish and wildlife. Alternative 2 would not impair fish and wildlife resources or values.

Special-Status Species

Analysis

Special-status species known or likely to occur in the immediate vicinity of the project area include Wawona riffle beetle, harlequin duck, California spotted owl, and nine species of bats (refer to Chapter III, Affected Environment, and Appendix D, Special-Status Species Evaluation, for additional information). The following subsections discuss impacts of Alternative 2 on these species and their habitat.

Wawona Riffle Beetle and Harlequin Duck. Dam removal would have localized, short-term, minor, adverse effects on Wawona riffle beetle and harlequin duck. Effects would be related to heavy equipment and human intrusion and could include vegetation removal, decreased oxygen levels, the addition of silt, resuspension of sediment, or the introduction of pollutants (i.e., fuels, lubricants). These actions could result in direct losses of individuals or habitat for Wawona riffle beetle and harlequin duck downstream of the dam in the gorge and El Portal river segments. The application of mitigation measures described in Chapter II, Alternatives (e.g., best management practices) would reduce the potential adverse impacts to Wawona riffle beetle and harlequin duck to a negligible intensity. Because dam removal would occur in a controlled manner, with the application of mitigation measures, Alternative 2 would result in a local, short-term, minor, beneficial impact to Wawona riffle beetle and harlequin duck compared to Alternative 1.

Removal of Cascades Diversion Dam would restore the free-flowing condition of the Merced River, return this portion of the river to a more natural state, and increase the amount of swift moving water, thereby enhancing the biological integrity of this segment for the beetle and

harlequin duck. The reconfiguration of the channel and bioengineered bank stabilization would re-establish near-natural conditions upstream of the impoundment and is expected to have a local, long-term, minor, beneficial effect on habitat for Wawona riffle beetle and harlequin duck at this location.

Special-Status Species of Bats and California Spotted Owl. Dam removal activities would have a local, short-term, minor, adverse effects on special-status bats and California spotted owl in the immediate vicinity of the project area. Effects would be related to heavy equipment and human intrusion and could include disruption of breeding activities or the possible direct destruction of bat roosts and owl nests (e.g., trees). The application of mitigation measures described in Chapter II, Alternatives (e.g., best management practices, limitation on the timing of dam removal activities) would reduce the potential adverse impacts to special-status bats and California spotted owl to a negligible intensity. Because dam removal would occur in a controlled manner, with the application of mitigation measures, Alternative 2 would result in a local, short-term, negligible, beneficial impact on special-status bats and California spotted owl compared to Alternative 1. In addition, the bioengineered bank stabilization and revegetation would have a local, long-term, negligible to minor, beneficial effect on habitat for special-status bats and California spotted owl at this location.

Summary of Alternative 2 Impacts. Dam removal activities would have a short-term impact to special-status species associated with ground disturbance and the potential introduction of pollutants. However, dam removal activities would occur in a controlled manner, with the application of mitigation, reducing the adverse effect to a negligible intensity. Therefore, Alternative 2 would have a local, short-term, negligible, beneficial effect on special-status species compared to Alternative 1. Removal of Cascades Diversion Dam and revegetation would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing the biological integrity of this segment for Wawona rifle beetle and harlequin duck, resulting in a local, long-term, minor, beneficial effect on habitat for Wawona riffle beetle and harlequin duck at this location. The bioengineered bank stabilization and revegetation would have a local, long-term, negligible to minor, beneficial effect on habitat for special-status bats and California spotted owl at this location.

Cumulative Impacts

The cumulative impact analysis for special-status species under Alternative 2 is the same as described under the No Action Alternative. See the discussion of cumulative effects under Alternative 1. Past, present, and reasonably foreseeable future projects in combination with Alternative 2 would have a net long-term, moderate, beneficial effect on habitat for special-status species within the Merced River corridor.

Impairment

Given the incorporation of mitigation into the design of this alternative, Alternative 2 would result in a local, short- and long-term, negligible to minor, beneficial impact to special-status species. Alternative 2 would not impair special-status species.

Air Quality

Analysis

Under Alternative 2, air quality effects would relate primarily to temporary use of equipment, dust, stockpiling, and vehicle travel, as well as tailpipe emissions from equipment. Alternative 2 would avoid the more extensive adverse effects of debris retrieval activities on air quality described under Alternative 1, because dam removal and sediment excavation would occur under controlled conditions and in a limited area. Dam removal and sediment excavation under the action alternatives would occur over a five-month period and would increase traffic volumes and associated tailpipe emissions on El Portal Road during transport of heavy-duty equipment, worker commute trips, and truck trips to haul debris materials. Emissions would be generated by truck trips required to remove excavated rock, concrete, and timber over the course of the two to three months of in-channel removal. Moreover, the staging area on the paved travel lanes of El Portal Road, the traffic bypass on the paved parking area, and secondary staging at Pohono Quarry would not be in close proximity to sensitive receptors. Excavated riverbed sediments could generate mildly unpleasant odors, but are not expected to be particularly odorous and would not affect daytime park users. In addition, best management practices (e.g., site watering, covering stockpiles, covering haul trucks, vehicle emission controls) would be utilized to reduce both tailpipe and fugitive dust emissions and would be made conditions of agreements with contractors. These practices are listed in Chapter II, Alternatives, and are common to all action alternatives. Controlled dam removal using best management practices under Alternative 2 would have a local, short-term, negligible, beneficial impact on air quality compared to Alternative 1. Alternative 2 would not result in a long-term impact to air quality.

Summary of Alternative 2 Impacts. Dam removal activities would result in a short-term air quality impact associated with vehicle emissions. Because dam removal and sediment excavation would occur in a controlled manner and would include the application of best management practices, Alternative 2 would avoid the more extensive adverse effects of debris retrieval activities on air quality described under Alternative 1. Therefore, Alternative 2 would have a local, short-term, negligible, beneficial effect on air quality compared to Alternative 1. Alternative 2 would not result in a long-term impact to air quality.

Cumulative Impacts

The cumulative impact analysis for air quality under Alternative 2 is the same as described under Alternative 1. See the discussion of cumulative effects under Alternative 1.

Cumulative actions would have a local, long-term, minor, beneficial impact on air quality. Alternative 2 and the cumulative projects would result in a local, long-term, minor, beneficial impact on air quality. Dam removal under Alternative 2, as compared to Alternative 1, would contribute to beneficial impacts on air quality in the short term.

Impairment

Impairment is not addressed in the air quality analysis because this resource topic is peripheral to the protection of the park for future generations.

Noise

Analysis

Dam removal under Alternative 2 would occur over a five-month period. Earthmoving activities (in-channel removal) would generate the highest noise levels and would occur over a two- to three-month period.

Material haul trips would also raise ambient noise levels along haul routes. Operation of heavy-duty equipment at the site during dam removal and sediment excavation would generate high noise levels. Table IV-1 provides typical noise levels generated by various heavy-duty equipment. Equipment operation could generate substantial amounts of noise and would occur within close proximity to river-related recreational uses. Other sensitive land uses (e.g., Cascades Picnic Area), located farther from the site, would be affected to a lesser extent. Noise effects in the project area would vary depending upon a number of factors, such as the number and types of equipment in operation on a given day, usage rates, the level of background noise in the area, and the distance between sensitive uses and dam removal activities. Alternative 2, however, would avoid the more extensive adverse effects of debris retrieval activities on the ambient noise environment described under Alternative 1 by working within a delineated area, under controlled conditions, and according to a planned timeline. In addition, best management practices described in Chapter II, Alternatives (e.g., limiting hours of dam removal operations, and shielding or muffling equipment) would reduce noise impacts from equipment associated with removal activities. Therefore, Alternative 2 would have a local, short-term, negligible, beneficial effect on the ambient noise environment compared to Alternative 1.

Summary of Alternative 2 Impacts. Dam removal activities would result in short-term noise impacts associated with equipment operation. Because dam removal would occur in a controlled manner and would include the application of best management practices, Alternative 2 would avoid the more extensive adverse effects of noise generated by debris retrieval activities on the ambient noise environment described under Alternative 1. Therefore, Alternative 2 would have a local, short-term, negligible, beneficial effect on the ambient noise environment compared to Alternative 1.

Cumulative Impacts

The cumulative impact analysis for noise under Alternative 2 is the same as described under the No Action Alternative. See the discussion of cumulative impacts under Alternative 1.

The cumulative actions would result in a local, long-term, minor, adverse effect on the noise environment. The local, short-term, negligible, beneficial effect under Alternative 2 would not improve this cumulative effect and, overall, Alternative 2 and the cumulative projects would result in a local, long-term, minor, adverse effect on the noise environment.

Impairment

Impairment is not addressed in the noise analysis because this resource topic is peripheral to the protection of the park for future generations.

Cultural Resources

Archeological Resources

Analysis

There are no known archeological resources located within the project area or in the vicinity of the dam. Further, the project area has been disturbed by past actions associated with dam, roadway, and utilities construction, from ongoing maintenance of those facilities, and from ongoing use of Pohono Quarry for staging and materials storage for park projects. Under Alternative 2, dam removal activities would require staging and operation along the banks of the Merced River, which could unearth as-yet unknown sensitive historic archeological resources. Ground-disturbing activities could result in a local, long-term, minor, adverse impact on historic archeological resources. Use of Pohono Quarry for secondary staging would not require ground-disturbing activities. Bank stabilization and revegetation would increase bank integrity and decrease potential erosion, therefore avoiding adverse erosion-related effects described under Alternative 1. In compliance with the stipulations of the park's 1999 Programmatic Agreement, cultural response monitors would study the project design drawings, contract specifications, and schedule to determine which project activities would have the potential to disturb as-yet unknown archeological resources. These project activities would be monitored by cultural resources specialists (see best management practices described in Chapter II, Alternatives). If as-yet unknown archeological resources are encountered, all actions would be performed in accordance with stipulations in the agreement (including monitoring of further earthmoving and dam removal activities). Archeological resources throughout the remainder of the Merced River corridor downstream of the dam would not be affected.

Summary of Alternative 2 Impacts. Ground-disturbing activities under Alternative 2 could have a local, long-term, minor, adverse impact to as-yet unknown archeological resources. Any actions would be performed in accordance with stipulations in the park's 1999 Programmatic Agreement.

Cumulative Impacts

Because it is not anticipated that this alternative would lead to disturbance of archeological resources, the cumulative impact analysis for archeological resources in Alternative 2 is the same as described under Alternative 1. See the discussion of cumulative impacts under Alternative 1. Alternative 2 and the cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, negligible to minor, adverse impact on archeological resources.

Impairment

Although archeological sites along the river are key cultural resources within the Merced River corridor, there are no known archeological resources in the project area. This action would be subject to site-specific planning and compliance and would be undertaken in accordance with stipulations in the park's 1999 Programmatic Agreement; thus, the effect of this action on archeological resources would not be considered severe. Archeological sites throughout the remainder of the Merced River corridor would not be affected. Therefore, this alternative would not impair archeological resources.

Ethnographic Resources

Analysis

There are potential ethnographic resources within the project area, consisting of plant material traditionally gathered for basketry, food, ceremonies, insect repellent, etc. Under Alternative 2, dam removal activities would require staging and operations along the banks of the Merced River, which could disturb plant materials that are considered ethnographic resources. Ground-disturbing activities could result in a local, long-term, minor, adverse impact on ethnographic resources. Bank stabilization and revegetation would increase bank integrity and decrease potential erosion, therefore avoiding the adverse dam debris and erosion-related effects described under Alternative 1. If ethnographic resources are encountered, all actions would be performed in accordance with stipulations in the park's 1999 Programmatic Agreement, such as disturbance avoidance or culturally sensitive design measures. In addition, the park would continue to consult with culturally associated American Indian tribes under this Programmatic Agreement and the cooperative agreement for traditional uses (see the best management practices described in Chapter II, Alternatives). Ethnographic resources throughout the remainder of the Merced River corridor downstream of the dam would not be affected.

Summary of Alternative 2 Impacts. Ground-disturbing activities under Alternative 2 could have an adverse impact to ethnographic resources. Any actions would be performed in accordance with stipulations in the park's 1999 Programmatic Agreement, such as disturbance avoidance or culturally sensitive design measures. In addition, the park would continue to consult with culturally associated American Indian tribes under this Programmatic Agreement and the cooperative agreement for traditional uses. Therefore, Alternative 2 would result in a local, long-term, negligible, adverse impact to ethnographic resources.

Cumulative Impacts

The cumulative impact analysis for ethnographic resources under Alternative 2 is the same as described under Alternative 1. See the discussion of cumulative effects under Alternative 1.

The cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, minor, adverse impact on ethnographic resources due to the disturbance of such resources. Alternative 2 and the cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, minor, adverse impact on ethnographic resources.

Impairment

Although ethnographic resources along the river are key cultural resources within the Merced River corridor, this action would be undertaken in accordance with stipulations in the park's 1999 Programmatic Agreement. Further, the effect of this action on ethnographic resources is negligible and adverse. Ethnographic resources throughout the remainder of the Merced River corridor would not be affected. Therefore, this alternative would not impair ethnographic resources.

Cultural Landscape Resources, Including Historic Sites and Structures

Analysis

Under Alternative 2, the potential for degradation of cultural landscape resources would be similar to that described under Alternative 1, since the Cascades Diversion Dam would no longer exist under either alternative. The primary difference is that the dam would be removed in a controlled manner under Alternative 2, compared to uncontrolled failure under Alternative 1. The controlled removal of the dam under Alternative 2, performed in accordance with stipulations in the park's 1999 Programmatic Agreement (see best management practices described in Chapter II, Alternatives), would avoid downstream impacts to other elements of the Yosemite Hydroelectric Power Plant, the Merced Canyon Travel Corridor, and the Coulterville Stage Road.

Cascades Diversion Dam is a historic resource that contributes to the cultural landscape as an element of the Yosemite Hydroelectric Power Plant. Removal of the dam would constitute a local, long-term, major, adverse impact on a historic property. However, at the present time, the dam is in a significantly deteriorated condition, is an unnatural obstruction in the Merced River, and presents a public health and safety hazard. As described in Chapter VI, Consultation and Coordination, Cascades Diversion Dam has been the subject of previous evaluation and mitigation actions. In 1986, the National Park Service evaluated the impacts associated with the demolition, relocation, and/or rehabilitation of all components of the Yosemite Hydroelectric Power Plant. This evaluation included the removal of the dam. With the completion of this evaluation, the National Park Service completed the consultation process associated with Section 106 of the National Historic Preservation Act of 1966, as amended, as required by the Programmatic Agreement. As part of this process, the National Park Service signed a Memorandum of Agreement with the California State Historic Preservation Officer and the Advisory Council on Historic Preservation, which included stipulations for dam removal.⁶ The National Park Service has complied with all stipulations of the Memorandum of Agreement and has sent a letter to the State Historic Preservation Officer indicating that the Section 106 consultation process is complete. Therefore, the intensity of the impact is reduced, and removal of Cascades Diversion Dam in compliance with stipulations in the park's 1999 Programmatic Agreement would result in a local, long-term, moderate, adverse impact to the cultural landscape.

Nationally significant historic resources throughout the remainder of the Merced River corridor, such as designed landscapes and developed areas, historic buildings, and circulation systems (trails, roads, and bridges), would be unaffected.

Summary of Alternative 2 Impacts. Controlled removal of Cascades Diversion Dam would occur in compliance with stipulations in the park's 1999 Programmatic Agreement, and compliance with the 1986 Memorandum of Agreement is already complete; therefore, Alternative 2 would result in a local, long-term, moderate, adverse impact to the cultural landscape.

⁶ Stipulations included the preparation of Historic American Engineering Report documentation, and the submittal of archival photographs and narrative to the State Historic Preservation Officer and the Fresno Metropolitan Museum. The pelton wheel turbines and sections of penstock and electrical equipment were removed and placed into the Fresno Metropolitan Museum for exhibit, along with an accurate scale model of the entire Merced River hydroelectric system.

Cumulative Impacts

The cumulative impact analysis for cultural landscape resources under Alternative 2 is the same as described under Alternative 1. See the discussion of cumulative effects under Alternative 1.

The cumulative projects would result in a local, long-term, minor, adverse impact on the cultural landscape due to the disturbance of cultural landscape resources. Alternative 2 and the cumulative projects would result in a local, long-term, minor, adverse impact on such resources.

Impairment

Although the dam is a contributing element of the Yosemite Hydroelectric Power Plant, the effect of this alternative on cultural landscape resources would be primarily localized and would not be considered severe. In addition, Alternative 2 would not change the treatment of cultural landscape resources. Cultural landscape resources throughout the remainder of the Merced River, downstream from the dam, would be unaffected. Therefore, Alternative 2 would not impair cultural landscape resources.

Social Resources

Transportation

Analysis

Alternative 2 would remove Cascades Diversion Dam and attendant structures, including the intake structure, currently used as an informal river-viewing platform, but the paved parking area and public telephone across El Portal Road from the dam would remain. Removal of the dam and intake structure would eliminate the traffic conflict that could arise when sightseers cross El Portal Road at an uncontrolled intersection to access the intake structure. Avoidance of this traffic conflict would result in a local, long-term, minor, beneficial impact compared to Alternative 1.

Alternative 2 would avoid the more extensive adverse effects of debris retrieval activities on traffic flow described under Alternative 1 because dam removal would occur under controlled conditions and in a limited area. Dam removal activities under Alternative 2 would occur over a five-month period and would increase traffic volumes on El Portal Road from transport of heavy-duty equipment, worker commute trips, and truck trips to haul debris materials. Truck trips would be required to remove excavated rock, concrete, and timber over the course of the two to three months of in-channel removal.⁷ There would be an estimated 260 truck loads of debris transported over the course of the project. In addition, project activities would generate additional truck trips between the dam and the secondary staging area at Pohono Quarry for the transport of equipment used infrequently during project activities and for transport of material removed from the dam. The number of truck trips on area roadways at any one time would vary, as the trips would be spread over the days of the construction period, and over the hours of the work days; a maximum of about 35 truck loads per day is expected. Moreover, by making use of the paved parking area north of the dam, two-way traffic on El Portal Road could continue, although temporary delays could occur at the dam and from vehicles turning onto and from El Portal Road at the entrance to Pohono Quarry. (People who otherwise would park to the north

⁷ Each truck load would generate two one-way trips (i.e., a trip by the loaded truck from the work site, and a return trip by the empty truck to the site).

of the dam would have to find alternative locations. This would result in a negligible increase in conflicts, because very few visitors use this parking area during the fall, when dam removal would occur.) In addition, best management practices would be utilized to reduce transportation effects and would be made conditions of agreements with contractors. These practices are listed in Chapter II, Alternatives, and are common to all action alternatives. Generally, these practices include implementation of a traffic control plan, which would include measures (e.g., advance warning signs, flaggers to direct traffic, and advance notification of visitors about the location, timing, and duration of dam removal activity) to maintain safe and efficient traffic flow during the dam removal period. Controlled dam removal using best management practices under Alternative 2 would have a local, short-term, negligible, beneficial impact on traffic flow compared to Alternative 1.

Summary of Alternative 2 Impacts. Under Alternative 2, avoidance of the traffic conflict to sightseers would result in a local, long-term, minor, beneficial impact compared to Alternative 1. Dam removal activities would result in a short-term increase in vehicle trips in the project area. Controlled dam removal using best management practices (see Chapter II, Alternatives) under Alternative 2 would have a local, short-term, negligible, beneficial impact on traffic flow compared to Alternative 1.

Cumulative Impacts

The cumulative impact analysis for transportation under Alternative 2 is the same as described under Alternative 1. See the discussion of cumulative effects under Alternative 1.

The cumulative projects would have a local, long-term, major, beneficial impact on transportation conditions along the Merced River corridor. Construction activities associated with the development of cumulative projects, however, would reduce the intensity of this beneficial impact to a minor or moderate level in the short term.

Alternative 2 and the cumulative projects would result in a local, long-term, major, beneficial impact on transportation conditions along the Merced River corridor. Controlled dam removal under Alternative 2 would contribute to this beneficial impact in the short term, as compared to Alternative 1.

Impairment

Impairment is not addressed in the transportation analysis because this resource topic is peripheral to the protection of the park for future generations.

Scenic Resources

Analysis

Under Alternative 2, Cascades Diversion Dam would be removed as soon as feasible. Removal of the dam would eliminate the adverse scenic resource impacts associated with leaving the structure in place under Alternative 1. Planned dam removal under Alternative 2 would prevent the deposition of dam debris in the river channel, the gouging of the riverbanks and channel, and the associated degradation of the scenic quality of these areas that would occur under Alternative 1. Accordingly, compared to Alternative 1, Alternative 2 would have a local, short-term, minor, beneficial impact.

Like Alternative 1, Alternative 2 would require the use of equipment to remove and transport dam materials from the existing site. The presence and operation of the equipment would detract from the scenic resource values of the Merced River corridor at the El Portal Road/Big Oak Flat Road intersection and between the dam and Pohono Quarry and Pohono Bridge. Equipment and material stored at Pohono Quarry would not be visible from El Portal Road or the Merced River due to forest cover in this area. However, because dam removal activities would be planned and controlled under Alternative 2, it is likely that dam removal and equipment transport would occur over a shorter period of time and within a more limited area of the river corridor than would be the case under Alternative 1. Accordingly, in avoiding the effects associated with uncontrolled dam failure under Alternative 1, Alternative 2 would have a local, short-term, minor, beneficial impact.

As under Alternative 1, removal of the dam would have a long-term, beneficial effect on the scenic resources of the natural landscape of the Merced River corridor in the vicinity of the El Portal Road/Big Oak Flat Road intersection. However, Alternative 2, unlike Alternative 1, includes bank stabilization and revegetation of the river-right bank. Upon dam removal and loss of the intake structure as an informal river-viewing platform, views of the river and dramatic rock formations in the area could still be observed from the vehicle turnout west of the dam along El Portal Road and from other nearby viewing locations. Removal of the dam would result in local, long-term, minor, beneficial effects on scenic resources along the Merced River corridor.

Damage to trees and streamside vegetation would be avoided, in contrast to the damage likely to occur along the riverbanks under Alternative 1 due to uncontrolled failure of the dam. Any area damaged during dam removal under Alternative 2 would be revegetated. Therefore, the riparian vegetation and natural landscape impact would be local, short-term, minor, and beneficial, as compared to Alternative 1. Site revegetation would increase riparian vegetation and natural landscape patterns in the area.

The long-term effects of dam removal would be beneficial under both Alternative 1 and Alternative 2. However, due to the bank stabilization and restoration efforts included, Alternative 2 would result in a local, long-term, minor, beneficial impact to scenic resources compared to Alternative 1.

Summary of Alternative 2 Impacts. In avoiding the effects associated with uncontrolled dam deterioration and eventual failure, which include deposition of debris in the river channel and visually prominent damage to the riverbanks and vegetation, Alternative 2 would have a local, short-term, minor, beneficial impact on scenic resources. The long-term effects of dam removal would be beneficial under both Alternative 1 and Alternative 2. However, due to the bank stabilization and restoration efforts included, Alternative 2 would result in a local, long-term, minor, beneficial impact to scenic resources compared to Alternative 1.

Cumulative Impacts

The cumulative impact analysis for scenic resources under Alternative 2 is the same as described under Alternative 1. See the discussion of cumulative effects under Alternative 1.

The cumulative projects within and in the vicinity of the Merced River corridor would result in a local, long-term, major, beneficial impact on scenic resources along the Merced River corridor because of the overall emphasis on restoring disturbed or developed land to natural conditions

and improving the health of ecosystems. Alternative 2 and the cumulative projects within the Merced River corridor would result in a local, long-term, major, beneficial impact on scenic resources in the Merced River corridor.

Impairment

Alternative 2 would have an overall beneficial impact on the visual landscape. Therefore, Alternative 2 would not impair scenic resources or values.

Recreation

Analysis

Alternative 2 would remove Cascades Diversion Dam and attendant structures, including the intake structure, currently used as an informal river-viewing platform. Removal of the dam would eliminate the potential for serious injury and/or fatality to sightseers who cross El Portal Road at an uncontrolled intersection to access the intake structure, and to recreation users who access the riverbed and timber dam crest and could fall from the dam structure. Following dam removal, sightseeing would continue to be available at the vehicle turnout west of the existing intake structure. Removal of the dam would also eliminate the potential for dam debris to cause serious injury and/or fatality to recreation users of the river downstream from the dam. Avoidance of hazards to recreation users of the river would constitute a local, short-term, moderate, beneficial impact of Alternative 2.

Alternative 2 would avoid effects resulting from dam deterioration and eventual failure on river-dependent active recreational uses in the vicinity of the dam and downstream. Under Alternative 1, debris and increased sedimentation in the river following dam failure would temporarily prevent or disrupt swimming, wading, and fishing. Under Alternative 2, dam removal would be controlled to prevent deposition of debris in the river and increased sedimentation associated with bank erosion. Accordingly, compared to Alternative 1, Alternative 2 would result in a local, short-term, minor, beneficial impact on river-dependent active recreational uses.

Removal of the dam under Alternative 2 would temporarily interfere with access to recreational opportunities through the El Portal Road/Big Oak Flat Road intersection and at the entrance to the Pohono Quarry on El Portal Road. Dam removal staging would be located adjacent to the intake structure, within the El Portal Road travel lanes. Two-way travel would be diverted through the area currently used as a visitor parking area, north of El Portal Road. In addition, project activities would require large vehicles to turn onto and from El Portal Road at the entrance to Pohono Quarry. Recreation users could experience temporary delays. No parking in the area north of El Portal Road or recreation activities within the project area would be permitted during dam removal activities (parking would be restored following dam removal). However, under Alternative 1, temporary obstruction of existing parking areas and trails and associated delays for recreation users would be likely in the event of dam failure. Failure of the dam would occur at a time and in a manner that cannot be accurately predicted, but could be catastrophic, requiring an immediate emergency response. Cleanup tasks under Alternative 1 would extend over a larger area than removal activities under Alternative 2, due to the uncontrolled transport of dam debris down-river to the Cascades Picnic Area, which could halt or curtail recreational access to this area for an extended period of time. Accordingly, compared to Alternative 1, Alternative 2 would result in a local, short-term, negligible to minor, beneficial effect on recreational access.

Summary of Alternative 2 Impacts. Compared to Alternative 1, elimination of the potential for injury and/or fatality to river-related recreation users under Alternative 2 would be a local, short-term, moderate, beneficial impact on recreation; a local, short-term, minor, beneficial impact on river-dependent recreation; and a local, short-term, negligible to minor, beneficial effect on recreational access.

Cumulative Impacts

The cumulative impact analysis for recreation under Alternative 2 is the same as described under the No Action Alternative. See the discussion of cumulative effects under Alternative 1.

The cumulative projects would have a local, long-term, moderate, beneficial effect on recreation due to expanded recreational opportunities in the Merced River corridor and improved transit service to more park destinations. Alternative 2 and the cumulative projects in the Merced River corridor would result in a local, long-term, moderate, beneficial impact on recreation due to expanded recreational opportunities in the Merced River corridor and improved transit service to more park destinations.

Impairment

Alternative 2 would result in a local, short-term, negligible to moderate, beneficial effect on river-related recreation in the Merced River corridor. Alternative 2 would not impair river-related recreational opportunities within the Merced River corridor.

Orientation and Interpretation

Analysis

Dam removal activities under Alternative 2 would not affect directional signage located in the vicinity of the project area. During dam removal activities, interpretive displays and information regarding the Cascades Diversion Dam Removal Project would be made available at the Yosemite Valley Visitor Center and/or the Cascades Picnic Area. Controlled removal of the dam would eliminate the potential for dam debris and erosion to affect downstream orientation and interpretation opportunities. Accordingly, compared to Alternative 1, Alternative 2 would have a local, short-term, minor, beneficial impact. Over the long term, Alternative 2 would have no effect on orientation and interpretation opportunities.

Summary of Alternative 2 Impacts. Under Alternative 2, the inclusion of interpretation opportunities during dam removal activities and the avoidance of the potential for dam debris and erosion to affect downstream orientation and interpretation opportunities would be a local, short-term, minor, beneficial impact on orientation and interpretation compared to Alternative 1.

Cumulative Impacts

The cumulative impact analysis for orientation and interpretation under Alternative 2 is the same as described under the No Action Alternative. See the discussion of cumulative effects under Alternative 1.

The cumulative projects would have a local, long-term, minor, beneficial effect due to expanded orientation and interpretation opportunities in the Merced River corridor.

Alternative 2 and the cumulative projects in the Merced River corridor would result in a local, long-term, minor, beneficial impact due to expanded orientation and interpretation opportunities in the Merced River corridor.

Impairment

Alternative 2 would result in a local, short-term, minor, beneficial effect on orientation and interpretation opportunities in the Merced River corridor. Alternative 2 would not impair orientation and interpretation opportunities within the Merced River corridor.

Socioeconomics

Analysis

The complete removal of Cascades Diversion Dam under Alternative 2 would result in direct spending on labor and equipment. The direct spending related to dam removal under Alternative 2 would be approximately \$2 to \$2.6 million (in 2003 dollars). Expressed in 2000 dollars, direct spending on complete dam removal would be between \$1.9 and \$2.5 million.⁸ Indirect and induced spending would also result from dam removal and would be approximately 45% of direct spending (NPS 2000a); therefore, a total economic impact resulting from spending on dam removal (direct, indirect, and induced) would be between \$2.8 and \$3.6 million in 2000 dollars. Some portion of total construction spending would be expected to occur outside the affected region. The duration of controlled dam removal activity is estimated to be approximately five months. Employment that would result from this level of direct and total spending would be approximately 36 to 46 jobs and 57 to 73 jobs, respectively, over the course of the five-month construction period.⁹ This increase in jobs represents a 2 to 2.7% employment increase in the number of construction jobs in the affected region. It is expected, however, that this employment increase would be somewhat less than 2%, because dam removal would occur during the fall (September through November), which is outside of the peak construction season for the affected region.

Controlled dam removal activity under Alternative 2 would generate output, employment, and income in the construction and mining sector of the regional economy. Alternative 2 would have a short-term, negligible, beneficial impact on the regional economy, due to the temporary nature of the dam removal and the small magnitude of associated spending (less than 1 percent) compared with the size of the construction industry in the affected region.

Summary of Alternative 2 Impacts. Alternative 2 would have a direct economic impact of \$1.9 to \$2.5 million and an indirect and induced impact of \$0.9 to \$1.1 million, which would result in a short-term, negligible, beneficial impact on the regional economy.

Cumulative Impacts

The cumulative impact analysis for socioeconomics under Alternative 2 is the same as described under the No Action Alternative. See the discussion of cumulative effects under Alternative 1.

⁸ Adjustment calculated using Consumer Price Index estimates provided by the U.S. Bureau of Economic Analysis (U.S. Bureau of Labor Statistics 2002).

⁹ Adjustment calculated using a multiplier from the *Yosemite Valley Plan* for estimating employment generated by construction spending (NPS 2000c).

The cumulative projects within and in the vicinity of Yosemite National Park would result in a local, long-term, negligible, beneficial impact to the regional economy, and a local, short-term, major, beneficial impact during construction. Alternative 2 would contribute to this local, short-term, beneficial impact due to temporary spending on dam removal activities.

Impairment

Impairment is not addressed in the socioeconomics analysis because this resource topic is peripheral to the protection of the park for future generations.

Park Operations and Facilities

Analysis

Because Alternative 2 would entail the use of heavy equipment to remove the dam, implement the bioengineered bank stabilization system, and revegetate the river-right bank, there is a risk of accidental damage to existing park facilities, particularly the wastewater line and electrical conduit under El Portal Road, where the dam removal staging would be located. While this alternative provides a margin for error, it should be noted that accidental damage to any of these utilities would interrupt wastewater and electrical service in Yosemite Valley and could result in a sewage spill in the project area, causing a substantial but short-term adverse impact. The risk of accidental damage to utilities would be reduced by the notification program that would be implemented as mitigation (see Chapter II, Alternatives). Use of Pohono Quarry as a secondary staging and storage area during project activities would not affect ongoing use of the quarry for similar purposes under other park projects. During project activities, the parking area (and public telephone) would be within a traffic detour area and would not be available for other park operations use. This area would be restored following project activities.

After the dam is removed, the river-right bank would be stabilized and revegetated to match adjacent bank composition, including the use of rocks, cobbles, and boulders. The large size of substrate materials along this stretch of the river provides for bank stability, which would protect the utility lines located under El Portal Road.

Alternative 2 would remove Cascades Diversion Dam and attendant structures, including the intake structure that is currently used as an informal river-viewing platform, but the paved parking area and public telephone across El Portal Road from the dam would remain. Because dam removal would occur in a controlled manner under this alternative (e.g., within a delineated area and using best management practices, such as a utility notification program [see Chapter II, Alternatives]), Alternative 2 would avoid the more extensive adverse effects to park facilities associated with catastrophic dam failure, as described under Alternative 1. Therefore, Alternative 2 would have a local, long-term, minor, beneficial effect on park facilities compared to Alternative 1.

Under Alternative 2, all aspects of the project would be overseen by park staff, including design and engineering, removal activities, utilities protection, and site restoration. Controlled removal of the dam under this alternative would place fewer demands on park operations staff than Alternative 1, which could require an emergency response to manage catastrophic dam failure and repair damaged facilities. As a result, Alternative 2 would have a local, short-term, minor, beneficial effect on park operations compared to Alternative 1.

Summary of Alternative 2 Impacts. Alternative 2 would avoid potential catastrophic damage to park facilities, resulting in a local, long-term, minor, beneficial impact compared to Alternative 1. Dam removal activities could result in damage to park facilities. Controlled dam removal under this alternative, with the application of mitigation measures, would have a local, short-term, minor, beneficial impact on park operations, due to the reduced demands on park operations staff compared to Alternative 1, which would require an emergency response to dam failure and damaged facilities.

Cumulative Impacts

The cumulative impact analysis for park operations and facilities under Alternative 2 is the same as described under the No Action Alternative. See the discussion of cumulative impacts under Alternative 1.

Overall, the past, present, and reasonably foreseeable future actions would have a local, moderate, adverse cumulative impact because of the increased demand on park operations, services, and facilities, over both the short and long term. These cumulative effects, in combination with Alternative 2, would result in a local, short- and long-term, moderate, adverse impact on park operations and facilities, due to the increased demand these projects would place on park operations, services, and facilities. The minor beneficial effects under Alternative 2 would not offset the adverse effects associated with the cumulative projects.

Impairment

Park operations are not subject to the impairment standard. The National Park Service has a management responsibility to conserve the scenery and natural and historic objects and the wildlife therein; park operations are not included within this management responsibility.

Alternative 3 – Partial Dam Removal

Alternative 3 includes complete removal of the dam, the river-left dam abutment, and the screenhouse on the intake structure, and restoration of the related river channel located beneath the dam site (see figure II-3). Under this alternative, the river-right dam abutment and intake structure would be retained for use as a river-viewing platform. Approximately 4,400 to 5,400 cubic yards of sediments (including rocks and boulders) in the area upstream of the dam would be excavated and repositioned to stabilize the river-right bank and decrease the potential for sediment erosion. Figure II-4 indicates the river profile at Cascades Diversion Dam before and after removal of the dam structure and sediments. Natural river processes would continue to transport remaining sediments (up to a maximum range of approximately 9,600 to 15,600 cubic yards of sediment) from the impoundment area over time, allowing for a gradual re-establishment of the natural river channel and related riparian habitat. It is expected that the river would fully recover incrementally over time, as sediments are transported from the impoundment area. However, the rate of natural channel recovery and restoration would be monitored to determine if additional restoration actions were necessary. Following removal of the dam and screenhouse, the river-right bank would be stabilized upstream and downstream of the intake structure using a bioengineered bank stabilization system to prevent erosion of the river-right bank. The objective of this alternative would be to restore the natural river character with a mixture and distribution of boulders, cobbles, gravels, sand, silt, soil, and vegetation similar to those found in adjacent riverbank segments.

Natural Resources

Geology, Geologic Hazards, and Soils

Analysis

Dam removal impacts on soils are the same as described under Alternative 2. See the discussion of these effects under Alternative 2.

Potential damage to the river-right abutment and intake structure from potential future rockfalls would be a long-term public safety risk, as Alternative 3 would use the intake structure as a viewing platform following dam removal. Destabilization of the river-right abutment and intake structure following a rockfall could cause damage to or destruction of the viewing platform, which would result in a public safety risk for those in the immediate area and for those downstream of the released debris. In addition, a rockfall event would deposit boulders and talus into the river reach in the former dam location, but would not damage structures other than the viewing platform. Under Alternative 3, this geologic hazard would be permanent, whereas the geologic hazard under Alternative 1 would be removed once the dam failed. Rockfall material could redirect riverflows, but given that the channel would down-cut and water velocity would increase through a narrower, rock-lined channel following river-right bank stabilization, the potential for bank scour adjacent to the road would decrease. The river-right viewing platform would also be subject to future seismic events, and some level of damage could occur, although collapse of the viewing platform from groundshaking is unlikely. Overall, compared to Alternative 1, Alternative 3 would have a long-term, negligible, adverse impact to public health and safety, due to potential damage to the viewing platform from geologic hazards. The impact would be negligible because the risk of potential adverse effects to public health and safety is slight.

Summary of Alternative 2 Impacts. Dam removal would have a short-term impact to soils as a result of ground disturbance activities. However, dam removal activities would occur in a controlled manner, with the application of best management practices. Since Alternative 3 would avoid the more extensive adverse effects of bank destabilization, erosion, and soil compaction and loss due to uncontrolled dam failure and debris retrieval activities described under Alternative 1, Alternative 3 would have a local, short-term, minor, beneficial effect on soil resources compared to Alternative 1. Site restoration and stabilization would reduce the potential for erosion and sedimentation, help stabilize channel shape and slopes, repair banks, and increase the protection of riverbanks, the adjacent roadway, and utility lines under El Portal Road, resulting in a local, long-term, moderate, beneficial impact on soils. Compared to Alternative 1, retention of the intake structure as a viewing platform would result in a local, long-term, negligible, adverse impact to public health and safety, due to potential damage to the viewing platform from geologic hazards.

Cumulative Impacts

The cumulative impact analysis for geology under Alternative 3 is the same as described under the No Action Alternative. See the discussion of cumulative effects under Alternative 1.

Past, present, and reasonably foreseeable future actions would result in a long-term, minor, beneficial cumulative impact to soil resources and to public health and safety with respect to geologic hazards. Overall, the cumulative projects would restore soils in the project region, reduce soil degradation, and decrease the density of people and facilities in the talus slope zone.

Alternative 3 and the cumulative projects would result in a local, long-term, minor, beneficial impact to soil resources and public safety with respect to geologic hazards. Alternative 3 would avoid the more extensive adverse effects of soil erosion and bank destabilization that would occur under Alternative 1.

Impairment

Alternative 3 would result in beneficial effects on soil resources, but a local, long-term, negligible, adverse impact to public health and safety due to potential damage to the viewing platform from geologic hazards. Although the Merced River system and its geologic resources are key natural resources components within the Merced River gorge, the effect of this alternative on public health and safety from geologic hazards would be localized to the immediate project area, and the risk to public health and safety would be slight. Therefore, the effect would not be considered severe, and Alternative 3 would not impair geologic resources.

Hydrology, Floodplains, and Water Quality

Analysis

Dam removal effects on hydrologic processes and water quality under Alternative 3 are the same as described under Alternative 2. See the discussion of these effects under Alternative 2.

Under Alternative 3, Cascades Diversion Dam would be removed, thus restoring the free-flowing condition of the Merced River and returning this portion of the river to a more natural state, thereby enhancing its natural hydrologic regime. Implementation of a bioengineered bank stabilization system on the river-right bank, using approximately 4,400 to 5,400 cubic yards of excavated sediments (including rocks/boulders), and revegetation of the river-right bank would

minimize lateral movement of the channel and decrease erosion, thereby protecting the bank from unnatural, accelerated erosion, although lateral movement of the channel to the north would be minimized by the presence of El Portal Road. The bank stabilization system to be implemented under Alternative 3 would result in a net increase in floodplain. Similar to Alternative 1, removing Cascades Diversion Dam would help restore the active flood regime and hydrologic processes. The removal of the dam would eliminate constriction of riverflow and improve the local, natural hydrologic regime. Under Alternative 3, the intake structure would remain within the bed and banks of the Merced River. The presence of the intake structure as a viewing platform would not initiate or increase streambank scour caused by upstream eddies, because the intake structure is anchored and a bioengineered bank stabilization system would be installed upstream and downstream from the intake structure. Although free flow of the Merced River would remain affected in the immediate area of the structure, natural sediment transport and fluvial processes would be restored. Retention of the intake structure would not affect floodplain values and long-term evolution of channel morphology. Compared to Alternative 1, Alternative 3 would have a local, long-term, moderate, beneficial impact on hydrologic processes by removing an unnatural constriction in the river, restoring the natural hydrologic regime of the river, avoiding downstream bank erosion and localized flooding associated with continued deterioration and eventual dam failure, and stabilizing the river-right bank.

Summary of Alternative 3 Impacts. Dam removal would have a short-term water quality impact related to the discharge of petroleum components. However, dam removal activities would occur in a controlled manner, with the application of best management practices. Compared to Alternative 1, Alternative 3 would have a local, short- and long-term, minor to moderate, beneficial impact on hydrologic processes and water quality by avoiding bank erosion and localized flooding associated with continued deterioration and eventual dam failure, reducing sedimentation, and controlling removal of the dam.

Cumulative Impacts

The cumulative impacts assessment for hydrologic resources under Alternative 3 is the same as described under Alternative 1. See the discussion of cumulative effects under Alternative 1.

The cumulative projects would result in an overall local, long-term, minor, beneficial impact to hydrologic processes and water quality. The past, present, and reasonably foreseeable future projects considered cumulatively with Alternative 3 would have a local, long-term, minor, beneficial impact on hydrologic processes. The beneficial impact associated with Alternative 3 would nominally contribute to the overall beneficial cumulative impact on hydrologic processes and water quality.

Impairment

Alternative 3 would have a local, short- and long-term, minor to moderate, beneficial impact on hydrologic processes and water quality. Alternative 3 would not impair hydrologic resources within the Merced River corridor.

Wetlands

Analysis

The effects of dam removal and revegetation on wetlands under Alternative 3 are the same as described under Alternative 2. See the discussion of these effects under Alternative 2.

The intake structure would remain within the bed and banks of the Merced River. Although free flow of the Merced River would remain affected in the immediate area of the structure, natural sediment transport and fluvial processes would be restored. Overall, this portion of the Merced River would be returned to a more natural condition, thereby enhancing its biological integrity. Alternative 3 would result in “no net loss” of wetland functions or values. Alternative 3 would result in a local, long-term, minor to moderate, beneficial effect on wetland and aquatic resources compared to Alternative 1.

Summary of Alternative 3 Impacts. Dam removal activities would have a short-term impact to wetland and aquatic habitat resources associated with ground disturbance and the potential introduction of pollutants. However, dam removal activities would occur in a controlled manner, with the application of mitigation, reducing the adverse effect to a negligible intensity. Therefore, Alternative 3 would have a local, short-term, negligible, beneficial effect on wetland and aquatic habitat compared to Alternative 1. Removal of the overflow portion of Cascades Diversion Dam and the river-left abutment would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing its biological integrity. Alternative 3 would result in a local, long-term, minor to moderate, beneficial effect on wetland and aquatic resources compared to Alternative 1.

Cumulative Impacts

The cumulative impact analysis for Alternative 3 is the same as described under the No Action Alternative. See the discussion of cumulative effects under Alternative 1. Past, present, and reasonably foreseeable future projects in combination with Alternative 3 would have a net long-term, major, beneficial effect on wetland patterns within the Merced River corridor.

Impairment

Given the incorporation of mitigation into the design of this alternative, Alternative 3 would result in a local, short- and long-term, negligible to moderate, beneficial impact to wetland and aquatic resources. Alternative 3 would not impair wetland resources or values.

Vegetation

Analysis

The effects of dam removal and revegetation on vegetation resources under Alternative 3 are the same as described under Alternative 2. See the discussion of these effects under Alternative 2.

The intake structure would remain within the bed and banks of the Merced River. Although free flow of the Merced River would remain affected in the immediate area of the structure, natural sediment transport and fluvial processes would be restored. Overall, this portion of the Merced River and its riparian vegetation would be returned to a more natural condition, thereby enhancing its biological integrity. Alternative 3 would result in “no net loss” of vegetation

functions or values. Alternative 3 would result in a local, long-term, minor to moderate, beneficial effect on vegetation.

Summary of Alternative 3 Impacts. Dam removal activities would have a short-term impact to vegetation associated with ground disturbance and potential the introduction of pollutants. However, dam removal activities would occur in a controlled manner, with the application of mitigation, reducing the adverse effect to a negligible intensity. Therefore, Alternative 3 would have a local, short-term, negligible, beneficial effect on vegetation compared to Alternative 1. Removal of the overflow portion of Cascades Diversion Dam and the river-left abutment would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing its biological integrity. Alternative 3 would result in a local, long-term, minor to moderate, beneficial effect on vegetation compared to Alternative 1.

Cumulative Impacts

The cumulative impact analysis for Alternative 3 is the same as described under the No Action Alternative. See the discussion of cumulative effects under Alternative 1. Past, present, and reasonably foreseeable future projects in combination with Alternative 3 would have a net long-term, major, beneficial effect on vegetation patterns within the Merced River corridor.

Impairment

Given the incorporation of mitigation into the design of this alternative, Alternative 3 would result in a local, short- and long-term, negligible to moderate, beneficial impact to vegetation. Alternative 3 would not impair vegetation resources or values.

Wildlife

Analysis

The effects of dam removal and revegetation on wildlife under Alternative 3 are the same as described under Alternative 2. See the discussion of these effects under Alternative 2.

Special-Status Species

Analysis

The effects of dam removal and revegetation on special-status species under Alternative 3 are the same as described under Alternative 2. See the discussion of these effects under Alternative 2.

Air Quality

Analysis

Impacts on air quality under Alternative 3 are the same as described under Alternative 2. See the discussion of these effects under Alternative 2.

Noise

Analysis

Impacts on noise under Alternative 3 are the same as described under Alternative 2. See the discussion of these effects under Alternative 2.

Cultural Resources

Archeological Resources

Analysis

Impacts on archeological resources under Alternative 3 are the same as described under Alternative 2. See the discussion of these effects under Alternative 2.

Ethnographic Resources

Impacts on ethnographic resources under Alternative 3 are the same as described under Alternative 2. See the discussion of these effects under Alternative 2.

Cultural Landscape Resources, Including Historic Sites and Structures

Impacts on cultural landscape resources under Alternative 3 are the same as described under Alternative 2. See the discussion of these effects under Alternative 2.

Social Resources

Transportation

Analysis

Under Alternative 3, the paved parking area across El Portal Road from the dam site would be removed, the area revegetated, and the intake structure retained and redeveloped for use as a formal river-viewing platform. Development of the viewing platform would include a pedestrian walkway connecting to the vehicle turnout on the same side of the road. The parking area across the road from the viewing platform could no longer be used as a meeting place by visitors to form carpools, which currently reduce traffic volumes and thereby improve traffic flow. This effect is minor, however, because of the low number of parking spaces available, the low number of parked cars observed at the parking lot, and the frequency of use by park operations staff. Use of the area by visitors orienting themselves to park destinations (i.e., consulting maps), visitors with disabled vehicles, and putting on or removing tire chains would be restricted to the existing vehicle turnout west of the dam, to other nearby turnouts, and to parking areas downstream and upstream of the project area. Use of the existing parking area for equipment staging and snowplow turnaround would no longer be available. Such uses would be relocated to Cascades Picnic Area (approximately one mile downstream on El Portal Road), Foresta Overlook (approximately three miles away along Big Oak Flat Road), and the turnout on Southside in the Bridalveil Fall area and the Bridalveil parking lot (approximately two miles upstream along El Portal Road). Therefore, removal of the parking lot under Alternative 3 would have a local, long-term, minor, adverse impact on traffic flow.

Removal of the parking area across El Portal Road would eliminate the potential traffic conflict that results when sightseers cross El Portal Road at an uncontrolled intersection to access the intake structure. The pedestrian walkway between the new viewing platform and the turnout would offer safe access for pedestrians and thereby avoid traffic conflicts. However, a potential traffic conflict would occur if westbound vehicles turn left across a double yellow line to access the turnout. Overall, there would be a local, long-term, negligible, beneficial impact associated with traffic conflicts compared to Alternative 1.

Alternative 3 would have the same short-term dam-removal-related impacts as Alternative 2 because both action alternatives would include a similar number of truck trips, use of the same staging areas, and both would employ best management practices (see Chapter II, Alternatives), including implementation of a traffic control plan (see the discussion of dam-removal-related impacts for Alternative 2). Therefore, controlled partial dam removal using best management practices under Alternative 3 would have a local, short-term, negligible, beneficial impact on traffic flow compared to Alternative 1.

Summary of Alternative 3 Impacts. Under Alternative 3, removal of the parking lot would have a local, long-term, minor, adverse impact on traffic flow. There would be a local, long-term, negligible, beneficial impact associated with traffic conflicts compared to Alternative 1. Dam removal activities would result in a short-term increase in vehicle trips in the project area. Controlled partial dam removal using best management practices (see Chapter II, Alternatives) under Alternative 3 would have a local, short-term, negligible, beneficial impact on traffic flow compared to Alternative 1.

Cumulative Impacts

The cumulative impact analysis for transportation under Alternative 3 is the same as described under Alternative 1. See the discussion of cumulative effects under Alternative 1.

The cumulative projects would have a local, long-term, major, beneficial impact on transportation conditions along the Merced River corridor. Construction activities associated with the development of cumulative projects, however, would reduce the intensity of this beneficial impact to a minor or moderate level in the short term.

Alternative 3 and the cumulative projects would result in a local, long-term, major, beneficial impact on transportation conditions along the Merced River corridor. Controlled dam removal under Alternative 3 would contribute to this beneficial impact in the short term, as compared to Alternative 1.

Impairment

Impairment is not addressed in the transportation analysis because this resource topic is peripheral to the protection of the park for future generations.

Scenic Resources

Analysis

Under Alternative 3, the short-term effects of dam removal activities on scenic resources would be the same as described for Alternative 2. See the discussion of these effects under Alternative 2.

Under Alternative 3, the long-term effects of dam removal on scenic resources would be the same as described for Alternative 2, with the exception that the intake structure would be retained as a river-viewing platform (the vehicle turnout west of the intake structure would also be available for river viewing). This human-made structure would continue to intrude upon the natural visual landscape at the dam site, particularly when viewed as foreground or middle ground from vehicles traveling west on El Portal Road. Viewed as background from distant vantage points, the remaining structures could be partly or completely obscured by vegetation. This structure does not dominate the natural landscape from any viewpoint. Alternative 3, unlike Alternative 1,

includes bank stabilization and revegetation of the river-right bank. Removal of the dam would result in a local, long-term, minor, beneficial effect on scenic resources along the Merced River corridor.

The long-term effects of dam removal would be beneficial under both Alternative 1 and Alternative 3. However, due to the bank stabilization and restoration efforts included, Alternative 3 would result in a local, long-term, minor, beneficial impact to scenic resources compared to Alternative 1.

Summary of Alternative 3 Impacts. In avoiding the effects associated with uncontrolled dam deterioration and eventual failure, which include deposition of debris in the river channel and visually prominent damage to the riverbanks and vegetation, Alternative 3 would have a local, short-term, minor, beneficial impact on scenic resources. The long-term effects of dam removal would be beneficial under both Alternative 1 and Alternative 3. However, due to the bank stabilization and restoration efforts included, Alternative 3 would result in a local, long-term, minor, beneficial impact to scenic resources compared to Alternative 1.

Cumulative Impacts

The cumulative impact analysis for scenic resources under Alternative 3 is the same as described under the Alternative 1. See the discussion of cumulative effects under Alternative 1.

The cumulative projects within and in the vicinity of the Merced River corridor would result in a local, long-term, major, beneficial impact on scenic resources along the Merced River corridor because of the overall emphasis on restoring disturbed or developed land to natural conditions and improving the health of ecosystems. Alternative 3 and the cumulative projects within the Merced River corridor would result in a local, long-term, major, beneficial impact on scenic resources in the Merced River corridor.

Impairment

Alternative 3 would have an overall beneficial impact on the visual landscape. Therefore, Alternative 3 would not impair scenic resources or values.

Recreation

Analysis

Alternative 3 would remove Cascades Diversion Dam and attendant structures, but would retain the intake structure as a viewing platform. Under Alternative 2, the parking lot north of El Portal Road would be permanently removed to avoid the potential for serious injury and/or fatality to sightseers who cross El Portal Road at this uncontrolled intersection. Access to the river-viewing platform would be provided via the vehicle turnout west of the intake structure. Removal of the dam structure would eliminate the potential for serious injury and/or fatality to sightseers who access the riverbed and timber dam crest and could fall from the dam structure. Removal of the dam would also eliminate the potential for dam debris to cause serious injury and/or fatality to recreation users of the river downstream from the dam. Avoidance of hazards to recreation users of the river would constitute a local, short-term, moderate, beneficial impact of Alternative 3.

Alternative 3 would avoid effects resulting from dam deterioration and eventual failure on river-dependent active recreational uses in the vicinity of the dam and downstream. Under

Alternative 1, debris and increased sedimentation in the river following dam failure would temporarily prevent or disrupt swimming, wading, and fishing. Under Alternative 3, dam removal would be controlled to prevent deposition of debris in the river and increased sedimentation associated with bank erosion. Accordingly, compared to Alternative 1, Alternative 3 would result in a local, short-term, minor, beneficial impact on river-dependent active recreational uses.

Removal of the dam under Alternative 3 would temporarily interfere with access to recreational opportunities through the El Portal Road/Big Oak Flat Road intersection and at the entrance to the Pohono Quarry on El Portal Road. Dam removal staging would be located adjacent to the intake structure, within the El Portal Road travel lanes. Two-way travel through this area would be diverted through the visitor parking area north of El Portal Road. In addition, project activities would require large vehicles to turn onto and from El Portal Road at the entrance to Pohono Quarry. Recreation users could experience temporary delays. No parking in the area north of El Portal Road or recreation within the project area would be permitted during dam removal activities. However, in the event of dam failure under Alternative 1, existing parking areas and trails could be temporarily obstructed, resulting associated delays for recreation users. Failure of the dam would occur at a time and in a manner that cannot be accurately predicted, but could be catastrophic, requiring an immediate emergency response. Cleanup tasks under Alternative 1 would extend over a larger area than removal activities under Alternative 3, due to the uncontrolled transport of dam debris in the river to the Cascades Picnic Area, and could halt or curtail recreational access to this area for an extended period of time. Accordingly, compared to Alternative 1, Alternative 3 would result in a local, short-term, negligible to minor, beneficial effect on recreational access.

Alternative 3 would permanently eliminate the parking area northeast of the El Portal Road/Big Oak Flat Road intersection. Groups occasionally use the parking lot as a meeting or stopping place and then proceed to other areas of the park. Climbing groups are known to park near Cascades Diversion Dam and then hike to a climbing site approximately one-half mile up Big Oak Flat Road. The permanent loss of the approximately 12 parking spaces available at this area to recreation users would be offset by the availability of parking in nearby areas. Compared to Alternative 1, Alternative 3 would result in a local, long-term, negligible to minor, adverse effect on recreational access.

Summary of Alternative 3 Impacts. Elimination of the potential for injury and/or fatality to river-related recreation users would be a local, short-term, moderate, beneficial impact on recreation; a local, short-term, minor, beneficial impact on river-dependent recreation; and a local, short-term, negligible to minor, beneficial effect on recreational access. Compared to Alternative 1, Alternative 3 would result in a local, long-term, negligible to minor, adverse effect on recreational access associated with the permanent removal of the parking area in the Cascades Diversion Dam vicinity.

Cumulative Impacts

The cumulative impact analysis for recreation under Alternative 3 is the same as described under the No Action Alternative. See the discussion of cumulative effects under Alternative 1.

The cumulative projects would have a local, long-term, moderate, beneficial effect on recreation due to expanded recreational opportunities in the Merced River corridor and improved transit service to more park destinations.

Alternative 3 and the cumulative projects in the Merced River corridor would result in a local, long-term, moderate, beneficial impact on recreation due to expanded recreational opportunities in the Merced River corridor. The local, long-term, negligible to minor, adverse effect on recreational access associated with the permanent removal of the parking area near Cascades Diversion Dam would be offset by the beneficial impact of the cumulative projects.

Impairment

Alternative 3 would result in a local, short-term, minor to moderate, beneficial effect on river-related recreation in the Merced River corridor. However, Alternative 3 would result in a local, long-term, negligible to minor, adverse impact on recreational access associated with the permanent removal of the parking area in the Cascades Diversion Dam vicinity. Although the Merced River system and river-related recreation provide important opportunities for enjoyment of the park, the effect of this alternative on recreation would be primarily localized at the dam area and would not be considered severe. The diversity and quality of recreational opportunities throughout the remainder of the Merced River corridor would not be affected. Therefore, Alternative 3 would not impair recreational opportunities within the Merced River corridor.

Orientation and Interpretation

Analysis

Under Alternative 3, the short-term effects of dam removal activities on orientation and interpretation opportunities would be the same as described under Alternative 2. See the discussion of these effects under Alternative 2.

Alternative 3 would remove Cascades Diversion Dam and attendant structures, but would retain the intake structure for use as a formal river-viewing platform. During dam removal activities, interpretive displays and information regarding the Cascades Diversion Dam Removal Project would be made available at the Yosemite Valley Visitor Center and/or the Cascades Picnic Area. Exhibits documenting the history of the dam and its relationship to the history of the park would be installed in the river-viewing platform area. Compared to Alternative 1, Alternative 3 would have a local, short-term, minor, beneficial impact. Because Alternative 1 would have no long-term effect, Alternative 3 would result in a local, long-term, minor, beneficial impact to orientation and interpretation opportunities compared to Alternative 1.

Summary of Alternative 3 Impacts. Under Alternative 3, the inclusion of interpretation opportunities during dam removal activities and avoidance of the potential for dam debris and erosion to affect downstream orientation and interpretation opportunities would be a local, short-term, minor, beneficial impact on orientation and interpretation compared to Alternative 1. Because Alternative 3 would include interpretive displays in the project area and Alternative 1 would have no long-term effect, Alternative 3 would result in a local, long-term, minor, beneficial impact to orientation and interpretation opportunities compared to Alternative 1.

Cumulative Impacts

The cumulative impact analysis for orientation and interpretation under Alternative 3 is the same as described under the No Action Alternative. See the discussion of cumulative effects under Alternative 1.

The cumulative projects would have a local, long-term, minor, beneficial effect due to expanded orientation and interpretation opportunities in the Merced River corridor.

Alternative 3 and the cumulative projects in the Merced River corridor would result in a local, long-term, minor, beneficial impact due to expanded orientation and interpretation opportunities in the Merced River corridor.

Impairment

Alternative 3 would result in a local, short-term and long-term, minor, beneficial effect on orientation and interpretation opportunities in the Merced River corridor. Alternative 3 would not impair orientation and interpretation opportunities within the Merced River corridor.

Socioeconomics

Analysis

Impacts to socioeconomics under Alternative 3 are the same as described under Alternative 2 because the same amount of spending would occur under both action alternatives. See the discussion of these effects under Alternative 2.

Park Operations and Facilities

Analysis

The short-term effects of dam removal activities and bank stabilization and revegetation under Alternative 3 on park operations and facilities would be the same as described for Alternative 2. See the discussion of these effects under Alternative 2.

The long-term effects of dam removal under Alternative 3 on park operations would be the same as described for Alternative 2, with the exception that the intake structure would be retained as a river-viewing platform and the parking area north of the dam would be removed. The National Park Service would make minor repairs (e.g., to the safety railing or concrete platform) as necessary. While minor repairs would also occur under Alternative 1, repair activities would not continue once the dam failed, and the long-term commitment of park operations for repairs would no longer be required under Alternative 1. Park operations that currently utilize the parking lot (heavy equipment staging and snowplow turnaround, equipment staging, and traffic control for road closure activities) would be restricted to the existing turnout west of the dam, to other nearby turnouts, and to parking areas downstream and upstream of the project area, as described above under Transportation. Use of the existing public telephone for access to the park's emergency response system would no longer be available. However, the frequency of mobile phone use, the frequency of vehicle travel through the El Portal Road/Big Oak Flat Road intersection, and the presence of public telephones at the Arch Rock Entrance station, Bridalveil Fall parking lot, and Crane Flat would prevent public health and safety impacts that could otherwise be associated with removing the public telephone. Therefore, Alternative 3 would result in a local, long-term, minor, adverse impact to park operations compared to Alternative 1.

Summary of Alternative 3 Impacts. Alternative 3 would result in a local, long-term, minor, beneficial impacts on park facilities because of the avoidance of potential catastrophic damage to park facilities compared to Alternative 1. Dam removal activities could result in damage to park facilities. Controlled dam removal under this alternative, with the application of mitigation measures, would have a local, short-term, minor, beneficial impact on park operations due to the

reduced demands on park operations staff compared to Alternative 1, which would require an emergency response to manage dam failure and repair potentially damaged facilities. Long-term minor repairs to the river-viewing platform under Alternative 3 would result in a local, long-term, minor, adverse impact to park operations compared to Alternative 1.

Cumulative Impacts

The cumulative impact analysis for park operations and facilities under Alternative 3 is the same as described under the No Action Alternative. See the discussion of cumulative impacts under Alternative 1.

Overall, the past, present, and reasonably foreseeable future actions would have a local, moderate, adverse cumulative impact because of the increased demand on park operations, services, and facilities, over both the short and long term. These cumulative effects, in combination with Alternative 3, would result in a local, short- and long-term, moderate, adverse impact on park operations and facilities, due to the increased demand these projects would place on park operations, services, and facilities. The minor beneficial effects under Alternative 3 would not offset the adverse effects associated with the cumulative projects.

Impairment

Park operations are not subject to the impairment standard. The National Park Service has a management responsibility to conserve the scenery and natural and historic objects and the wildlife therein; park operations are not included within this management responsibility.